DECEMBER 1961

Volume 56 Number 12

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SCIENCE

FOUNDED 1905

IN THIS ISSUE

SPECIAL DAIRY HERD MANAGEMENT AND PREVENTATIVE MEDICINE SECTION

SUTURING NEGLECTED TEAT WOUNDS

SUPPRESSION OF ESTRUS IN CATS

HOW YOU CAN HELP YOUR TAX COUNSELOR

Complete Index on Page 5a

East Lansing, Mi.

Library, Michigan Univers

"Paul Tringle was loaded for something . . .

"It started with a phone call from Paul's wife, Harriet. 'Please come over right away, Doc. Paul's having trouble, just as you said he would.'

"So, away I went, prepared to spend a few hours with Paul's hogs. I was right. We'll skip the details, and get to the interesting part of the story.

"When Paul and I got back to his house after cleaning up the mess, I noticed a new refrigerator on the back porch. Harriet opened it.

"It was loaded with a few hundred dollars' worth of stuff for treating every kind of animal Paul had on the farm, including cats and dogs. The packages were dressed up in new labels, but I knew what they were. I knew, also, that Paul didn't know how to use any of this properly. Hence, the call from Harriet.

"I dislike this wide-open selling to laymen. That's why I confine my buying of veterinary supplies to those distributors who sell to veterinarians only."

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233—365

Veterinary Medicine
Volume 56 Number 12
December, 1961

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Publisher's Notes

C. M. Cooper

The Christmas season is cherished by youngsters and is a socially acceptable time for grown men to briefly drop the armor that shields their true feelings and emotions from their fellow men.

In the normal course of professional endeavor and competitive business activities, man's intense, fear-driven pursuit of success and security molds battle-hardened defenses which leave little room for recognition and appreciation of those we work with daily.

In the spirit of the season, the entire staff of VETERINARY MEDICINE wishes to take this opportunity to say thanks to you, our colleague and reader, for making possible our 56th continuous year of publication.We send you and your family best wishes for a happy Christmas.

In this issue, we call your special attention to the editorial thoughts concerning large animal practice and the related reports on development of dairy herd disease prevention programs. Regardless of your chosen specialty, we believe the future of large animal practice warrants your attention.

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LETTERS TO THE EDITOR

An Appeal From Korea

Dear Dr. Quin:

I have read in VETERINARY MEDICINE of your interest in Dr. Schofield's work in Korea. While I was stationed in Korea I became acquainted with another project that is also worthy of support from us.

Father Patrick McGlinchey, a Catholic priest of the Columban order has imported sheep and developed sheep raising as a 4-H project on a volcanic island named Chejudo some 80 miles off Korea's south coast. With the wool from these sheep, Father McGlinchey has his club prepare and weave the yarn into rough homespun much as was done in his native Ireland and in the U. S. many years ago. Father McGlinchey, as does Dr. Schofield, exemplifies the finest ideals of Christian service. He will also spend the remainder of his life in Korea in this service. He speaks Korean fluently (complete with a "Cheju" accent) and puts special emphasis on his work with the 4-H Clubs.

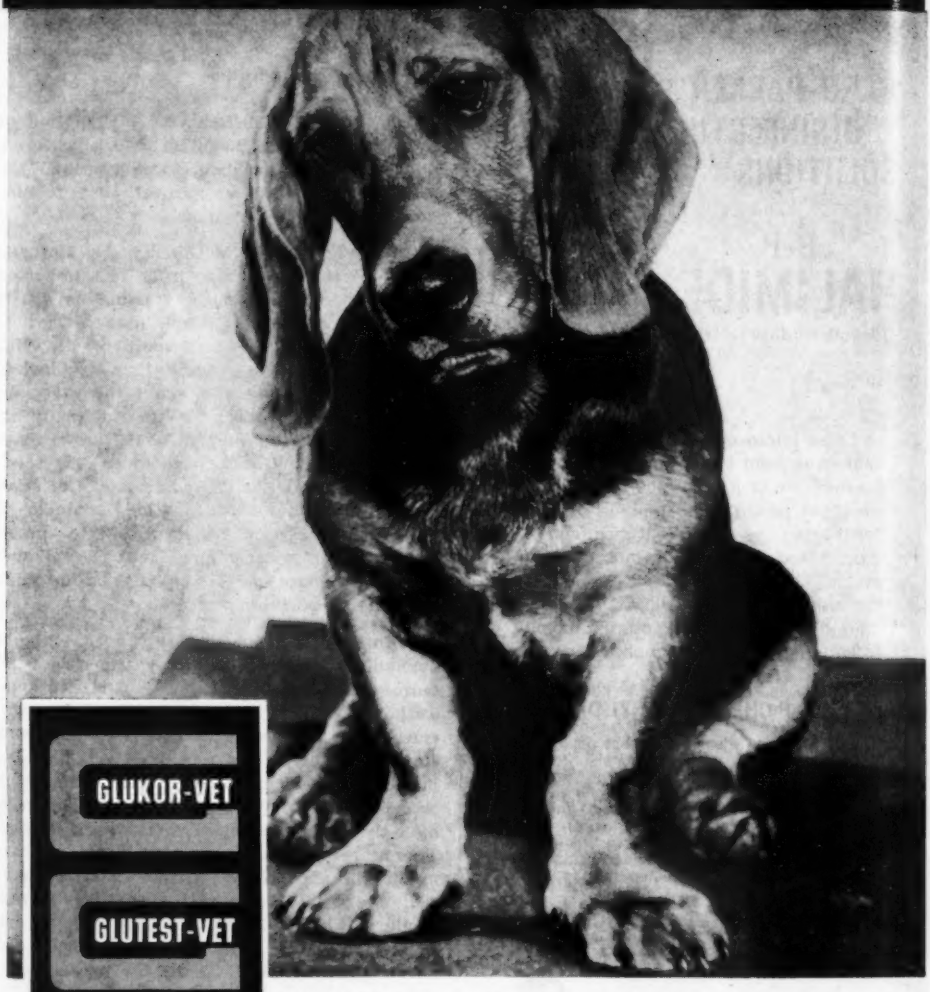
Father McGlinchey works with what is available to him. This many times is little more than basic necessities. The National Catholic Welfare Committee (NCWC) provides help, and people who know of his work also try to help. His recent letter tells of a problem for which assistance must come from those of us who not only want to help but also have the understanding of what will be needed. There are various disease problems appearing in the sheep band. In his letter, he says . . . "we're in trouble with sheep-liver flukes. Could you help me by contacting some veterinary supply firm to let me have medicine for this condition as well as dip for parasites?

"If you can get it for me, I'd appreciate it. Have it shipped to: Catholic Relief Services, NCWC, Parkway Industrial Center, Haswell and Eastchester Road, Bronx, New York (warehouse address) for: Rev. P. J. McGlinchey, Cheju Island, Korea via Pusan.

"A note advising shipment should go to: Mr. Edward Kinney, Catholic Relief Services, Shipping Dept., 451 Madison Avenue, New York, New York.

(continued on page 10a)

REJUVENATION!



GLUKOR-VET is the original synergistically fortified chorionic gonadotropin for male animals. Dramatic results have been obtained with the use of this product in both large and small animals when treating conditions that arise from middle and older age decline.[1] GLUKOR-VET has also been found effective in treating stale race horses and geldings.[2] (Supplied in 10 and 25cc multiple dose vials.) U.S. Patent No. 2,943,020.

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RESEARCH SUPPLIES-PHARMACEUTICALS, Dept. of Veterinary Medicine, Pine Station, Albany 3, New York

[1]Lombard, F. A. and Isachsen N.O., Vet. Med., Aug. '60. [2]Fobian, V.C., Vet. Med., Jan. '61.

Entrance level for veterinarians in the regulatory programs of the Agricultural Research Service has been increased from GS-9, $6,435 per annum, to GS-11, $7,560 per annum, for those with one or more years of professional experience in any kind of endeavor. Those with less than one year of professional experience following graduation will continue to enter the federal service at GS-9, $6,435 per annum, but may be promoted to the higher rate of pay as soon as they have obtained the necessary year of experience.

A 16-member Citizens Advisory Committee has been named by Health, Education and Welfare Secretary Ribicoff. This committee will make recommendations regarding steps the Dept. of Health, Education and Welfare and the F.D.A. should take to insure adequate protection to citizens in their use of foods, drugs, therapeutic devices, cosmetics and household chemical products. Though other segments of the food producing industry are represented, there are no veterinarians on this committee. George H. Harvey of the University of Missouri is chairman.

Local veterinarians should be alert for possibility of biological attack. Dr. Frank A. Todd, assistant to the administrator for emergency programs in the USDA, urges that the practicing veterinarians report promptly any increased incidence of domestic or unusual disease conditions. The local practitioner should report immediately to the state veterinarian or ARS disease eradication veterinarian in charge.

Dr. Kenneth W. Smith, professor of clinics and surgery at Colorado State University, has been selected editor of the small animal section of the first Yearbook of Veterinary Medicine. The first volume is scheduled for release early in 1963. Yearbook Medical Publishers, Inc., will publish the book.

The veterinary film, ''Respiratory Problems of Brachycephalic Dogs'' was named the best professional medical film of the year by the Biological Photographic Association. Dr. Harmon C. Leonard of Cheshire, Conn., narrates this film, which was produced for Schering Corporation's veterinary division.

"The drugs will be shipped to Korea at no cost to me. To cover the cost of handling and freight from the supplier to New York, please bill: Rev. Edward MacManus, St. Columban's, Nebraska, telling him to take the amount from my bill.

"If anything is available for shipment, please write me at: Rev. Patrick J. McGlinchey, Catholic Church, Hallim, Cheju Island, Korea."

I have already ordered hexachlorethane and lindane for him (enough for immediate needs); if you know of others who might be interested in helping, it would be for a worthwhile undertaking and be genuinely appreciated.

James A. Gourlay, D.V.M.
USOM Box Cam
APO 153, San Francisco, California

Authors Omitted from August Issue Article

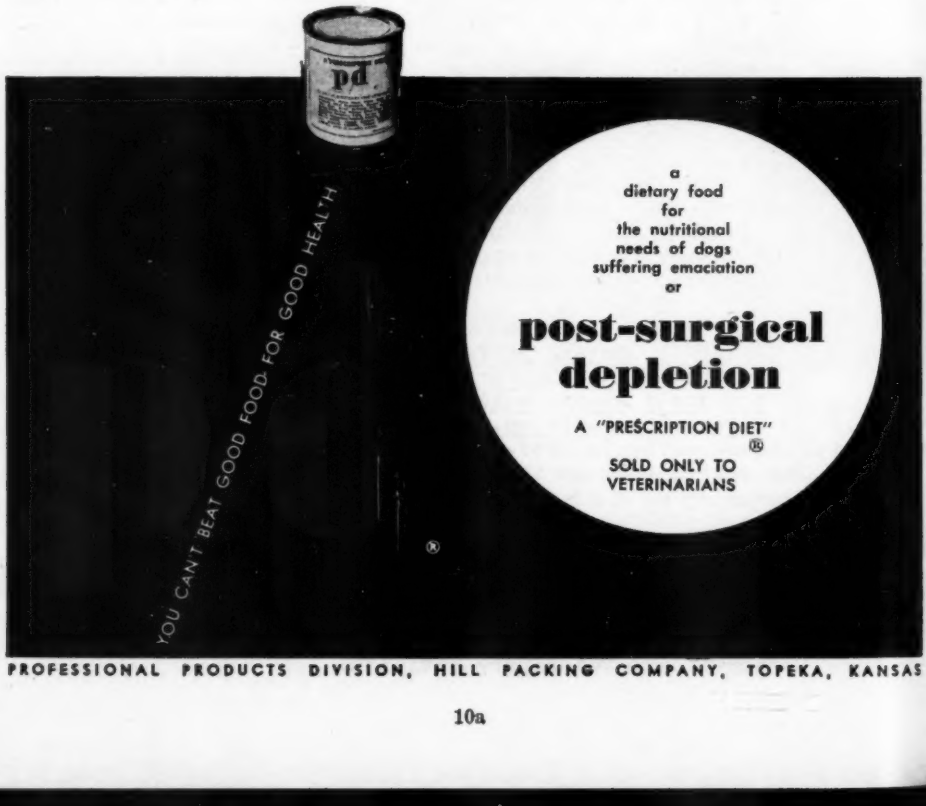
Dear Editor:

I was dismayed and find it hard to understand why Drs. B. E. Hooper and K. H. Niemeyer were not included as authors for "Rabies in the Domestic Cat," VETERINARY MEDICINE, page 339, August, 1961.

Dr. Hooper, who is presently engaged in graduate study in the department of microbiology, pathology and public health of Purdue University, and Dr. Niemeyer of the department of medicine and surgery of the University of Missouri did the clinical work on the cases reported in this paper.

D. C. Blenden, D.V.M.
University of Missouri

We apologize for this error of omission. Editors.



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To find out how you can *really* be in this colorful picture, turn the page and...

Enter Pfizer's Big

"Can You Top This?" Contest

"Was that the only balling gun you had with you, Doctor?"

Reprinted from "The Best of RMM" by Robert M. Miller, D.V.M., with the express permission of the publishers, American Veterinary Publications, Inc.

Can you top this caption?

Try, anyway. Because every qualified entry—all veterinarians on Pfizer's Direct Order Plan—will receive a *monogrammed desk pen set FREE* just for entering.

Cartoonist, Dr. Robert Miller, author ot "The Best of RMM", will be one of the judges in the "Can You Top This?" contest.

When the Pfizer representative contacts you (the winner), simply tell him when you want to go (anytime during 1962) . . . where you want to stay . . . and what you want to see or do. Everything will be done to pave the way for an exciting two weeks in sunny Acapulco with all expenses paid. ($1500 value.)

But, if you prefer, Pfizer will send you a check for $1500.

Here's how to enter:

1. Write your caption to the cartoon illustrated. Trv to better this one bv Robert M. Miller, D.V.M., from "The Best of RMM".

2. Clip out and fill in the handv entrv blank below.

3. Mail on or before midnight, December 31, 1961.

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(in not more than 25 words)

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Name _____

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Turn the page for special contest rules.

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Contest Special Rules

1. All entries must be postmarked on or before midnight, December 31, 1961, and received no later than midnight, January 15, 1962.

2. Entries will be judged on the basis of humor, appropriateness (specific reference to the situation illustrated in the cartoon), freshness (interest, creativeness, "sparkle"), and sincerity (believability). Decision of judges final. Duplicate prizes will be awarded in event of ties.

3. Every qualified entry—veterinarians on Pfizer's Direct Order Plan—will receive a free monogrammed desk pen set.

4. The winner will be notified by mail by about March 1, 1962. He will receive a free vacation for two in Acapulco, Mexico ($1,500 value), or $1,500 in cash—whichever he prefers.

5. All entries become the property of Chas. Pfizer & Co., Inc., and cannot be returned.

6. All licensed veterinarians on Pfizer's Direct Order Plan may enter. Not eligible are employees of Chas. Pfizer & Co., Inc., or its advertising agencies (and their families). Contest void where prohibited by law.

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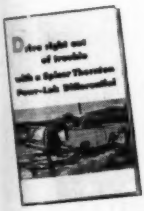

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VETERINARY DIVISION

Editorially Speaking

Where Does The Large Animal Practitioner Stand? As we approach year end with nearly 50,000 miles of meeting circuit travel under the belt, we are moved to take a few minutes to review what we have seen and heard and attempt to anticipate what lies ahead.

In state after state and meeting after meeting, one thought is ever present. Veterinary practitioners, particularly those associated with large animal medicine, are concerned about their future. They are in a period of change brought about by a revolution in agriculture. As practitioners, they are not sure where they fit into the picture now or five or 10 years from now.

As we see it, the following factors and problems reflect the underlying concerns that practitioners feel as we approach the end of 1961.

Agriculture is changing from small farm units to larger specialized units. Innovations in breeding, feeding and management have brought many interesting problems to disease control. Practice has changed from mere treatment to preventive medicine. Progress is important, but these changes are coming faster than many veterinarians feel they can cope with. Leadership is needed.

Drug distribution patterns are also being drastically shaken by these same changes. It is apparent that in the next five years there will be many new sales schemes tried by drug and biological manufacturers in an effort to retain competitive status in a changing market. Some feel that practitioners should derive their income from services, not from mark-up on drugs, Radical experimentation and change can be anticipated in this area.

Government programs are increasing in number and size. Where do these programs originate? Do producers ask for them? If so, why does it take so much education and promotion to put them across? Tuberculosis and brucellosis programs are well under way and hog cholera and sheep scab programs are in full bloom. It is speculated that programs are on the drawing board encompassing leptospirosis and anaplasmosis. Practitioners are conspicuous by their absence at U. S. Livestock Sanitary Association Meetings and and in the general planning of such programs.

Many practitioners feel that they are going to work on a retainer basis. Other practitioners are looking for leadership in development of group practice and practice specialization. The need is here now, but leadership is scanty.

Practitioners are not recruiting students to enroll in veterinary school because they can't conscientiously encourage a young man into a profession requiring six or seven years of college when the income per hour is often less than that of a plumber. Maybe the large animal practitioner needs help from other segments of the profession in building a better image.

The large animal practitioner is dealing with an industry suffering from great price fluctuations, overproduction and befuddled government programs. Who can predict what practice will be like five to ten years from now? How should it be? Are these problems the sole responsibility of practitioners? How close are we now to socialized veterinary medicine? Is the practitioner still the lifeblood of disease control? Does the practitioner want guidance or does he want to solve these problems himself?

These random thoughts and observations reflect the current picture as we have seen and heard it. It is far from one of total blackness because large animal practice is surging forward successfully on a localized and scattered basis.

As we move into another year, this publication is rededicating itself to provide a continuing forum for constructive suggestions and principles proven valuable to the advancement of veterinary practice. We will diligently try to report the picture factually, avoiding the mistake of establishing this publication as *super-being* possessing all answers.

We will continue to search out those who have found useful and practical approaches and help share these findings with the whole profession. In turn, we invite you to speak up and share your opinions and observations through the pages of VETERINARY MEDICINE.

In pursuit of these objectives, sponsorship of a special symposium in Kansas City is being considered in March of 1962 to deal with the current problems of large animal practice. The objective would be to consolidate the findings and methods of practitioners throughout the country who are successfully engaged in group and specialized practices with emphasis on preventive medicine programing. Would you attend such a meeting? Would you like to have the proceedings of such a meeting in your library? Your counsel would be appreciated.

*Based on 610 cases in the files of the Veterinary Medical Department, Schering Corporation.

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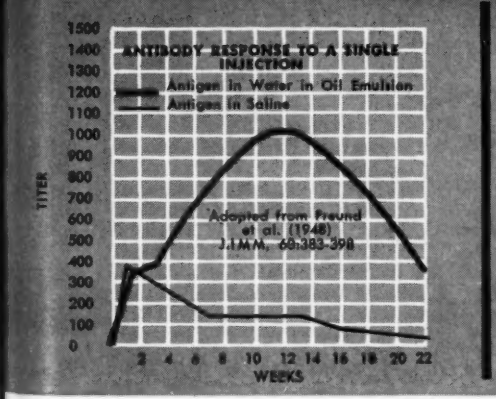

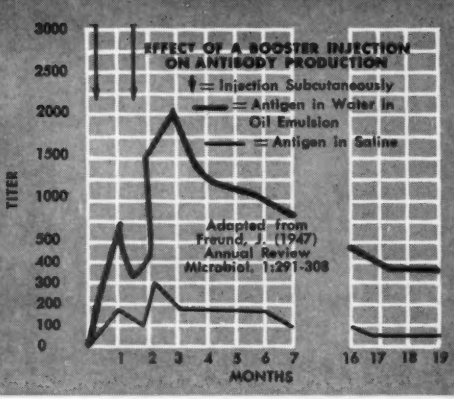

*Consists of inactivated bovine origin cultures containing Streptococcus (pyogenic) 50%; Corynebacterium pyogenic 30%; Staphylococcus aureus (with its toxoids) 10%; Escherichia coli 10%.

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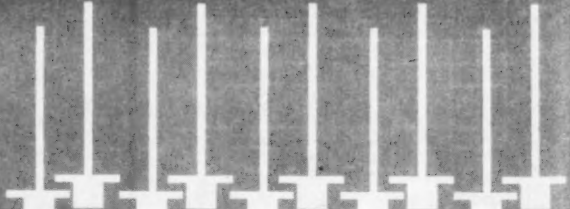

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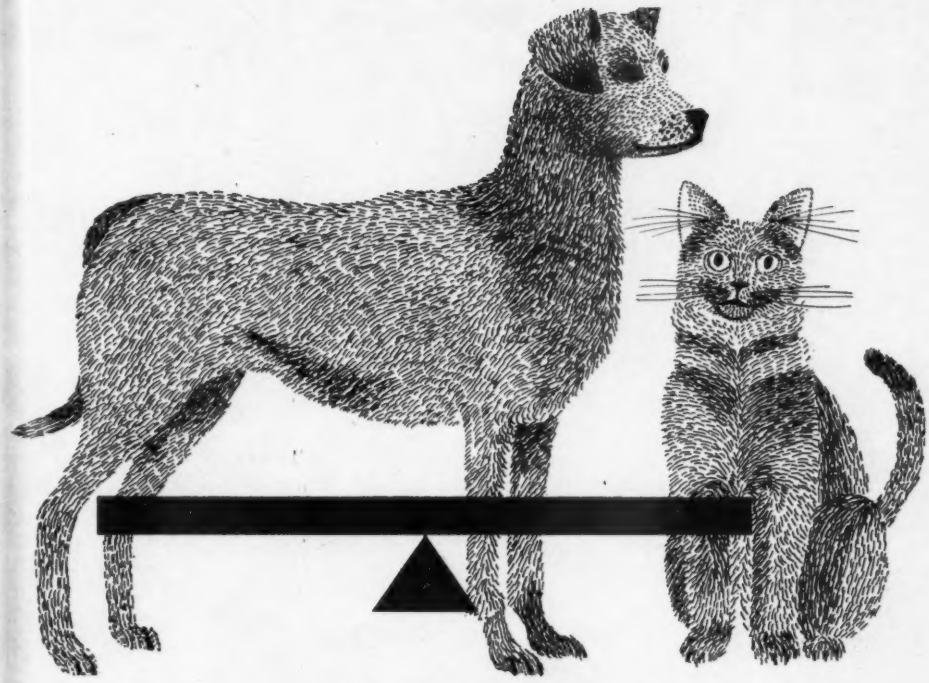

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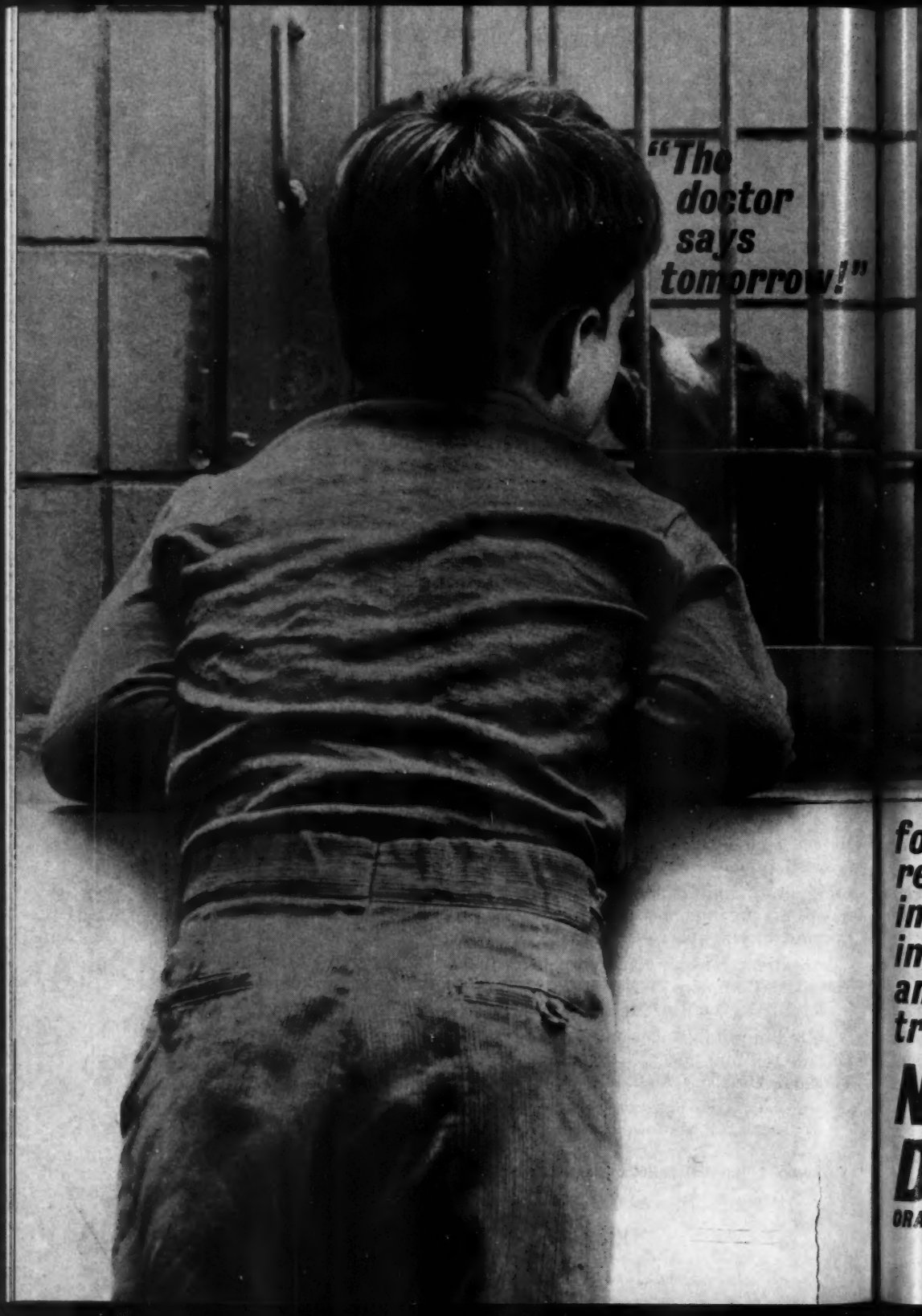
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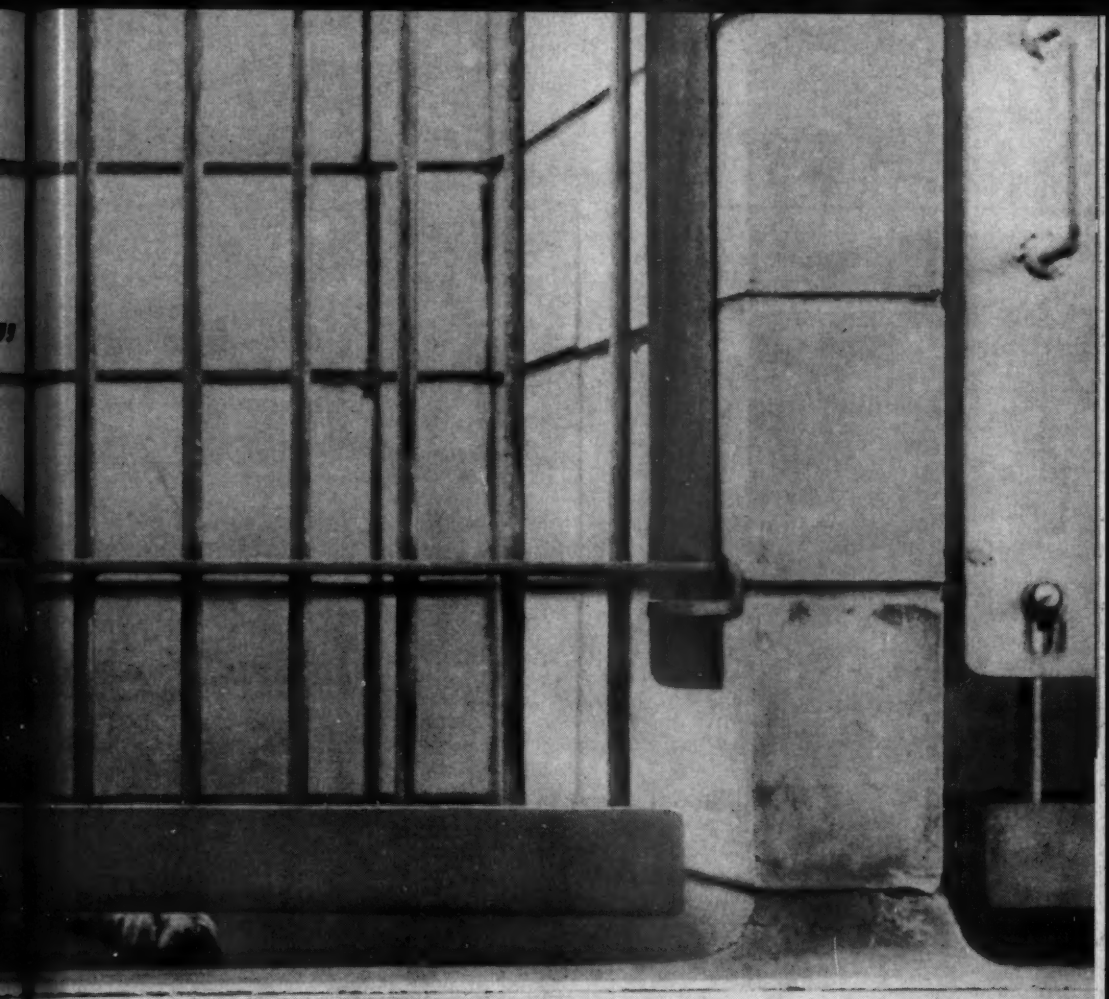

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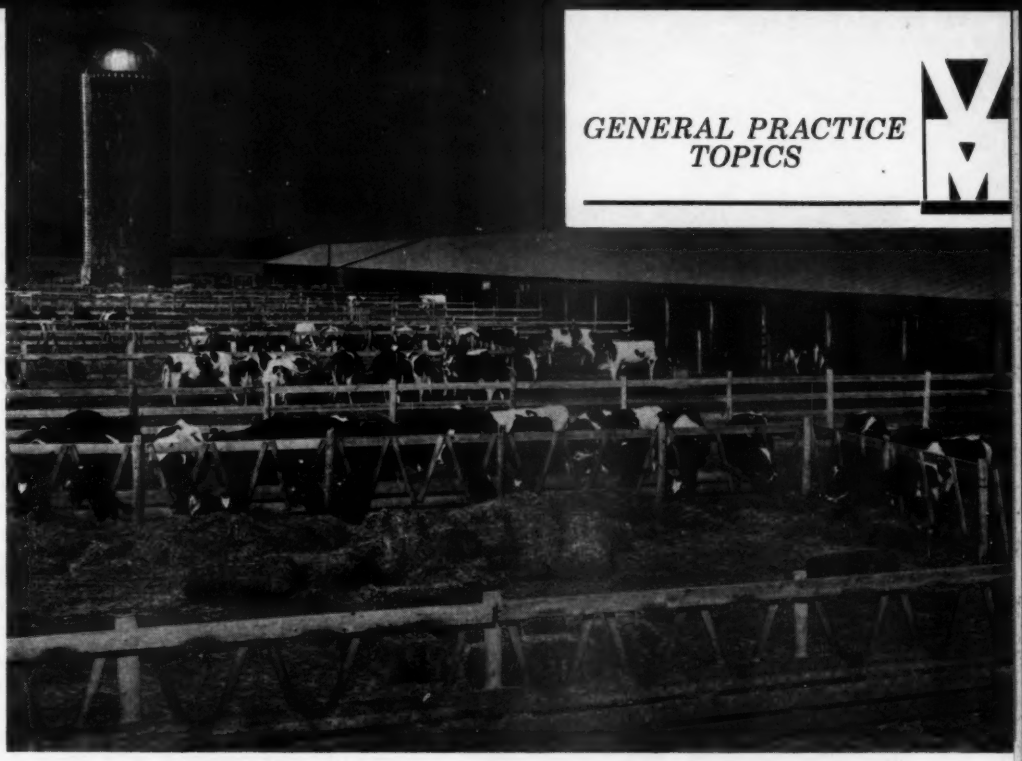


A Disease Control Program for the Dairyman

John B. Herrick
Extension Veterinarian
Iowa State University
Ames, Iowa

Agriculture is changing, changing to the point that many of our former livestock enterprises are becoming larger, more specialized, and in many cases, integrated. Consequently, the practice of large animal veterinary medicine is changing. As a result of these changes our large animal practitioners are looking at the entire picture of veterinary medicine, trying to calculate where they will fit in and the position that they will have in 10 to 15 years. There are many considerations to be given to this changing picture. The livestock enterprises that we will have in our practice areas in the future are going to be much more specialized and will be operated by learned people who will know the economics of livestock production. Thus, our large animal veterinarians of today and tomorrow must be aware that agriculture is a business and that veterinary medicine is concerned with agriculture. The veterinarian will have to be cognizant of the economics of preventive medicine in large animal production.

There is already a great deal of consternation in the minds of many veterinarians throughout the country concerning the ethics and the feasibility of contract veterinary medicine. In some areas today, veterinarians have set up such contracts, and we hear much discussion concerning this phase of large animal practice. Some veterinarians

Individual calf stalls for raising dairy calves where disease problems cause difficulties.

have the opinion that this is the last of free enterprise, and the end of the individualism that exists among the large animal practitioners in the United States. We have also heard of solicitation of clients by some veterinarians in an attempt to place large herds on a herd health contract which rightfully belong in the practice area or are the clients of their neighboring colleagues. This is not new to large animal practice, although it is a phase that we as veterinarians should not tolerate.

All veterinarians should believe in and practice preventive medicine. It is true that many veterinarians have attempted to practice preventive medicine in the past and have done a reasonably good job. On the other hand, the majority of large animal practitioners will openly admit that much time in their practice is spent in putting out fires after they have started instead of planning to prevent the fires before they start. In other words, they have been primarily concerned with treating the sick, and in many cases, treating the sick which have been treated by the owners who finally gave up in desperation and called their veterinarian. Veterinarians, as a result, have not had the time to practice preventive medicine. One practitioner was recently heard to state that he could contribute more to the net income of a good client by spending one hour with him in his office, discussing ways of preventing disease outbreaks in the client's livestock, than by attempting to treat an animal that already had fallen prey to a combination of mismanagement and disease. He felt that his value to the livestock owner was greater in the form of consultation in preventing disease than in being a veterinary mechanic. However, it is realized by all veterinarians that both phases of veterinary medicine must continue to adequately serve the livestock industry.

Changes Observed in Dairying

One phase of livestock production that has undergone considerable change since World War II is the dairy business. It is estimated there are now 40% fewer dairymen than at the end of World War II. Yet currently, there is greater production of milk than at that time. In general, the change is one of fewer dairymen with larger dairy herds and increased quality of the dairy cow. Available figures show that the average butterfat production for one dairy area in 1950 was 250 lb. of butterfat per cow per lactation. This is now over 300 lb., and an increasing number of herds have production records of 400 lb. or more on a herd basis, while 500 lb. herd averages are not uncommon.

We are observing larger, more efficiently managed herds. These herds are specialized livestock production units handled by experienced men who understand the economics of dairying. They are in a position to know the value of production records, the cost of production, the cost of prolonged calving intervals and the cost of infertility. In general, these dairymen are conscious of the cost of disease in a dairy herd. This places a challenge upon the shoulders of practicing veterinarians to understand production problems. The practicing veterinarian is in a position to be aware of all the management phases that contribute to production problems, and can counsel the dairymen in setting up herd health practices that will help to achieve these goals.

Cow Pools and Contract Dairying: There are other changes in dairying that are being observed by the entire industry with interest. Large commercial dairy herds are not new. They have been operating for some time in some western states and in a few eastern states. However, in the midwest where the average dairy herd did not consist of more than 20 to 25 cows, the new innovation of cow pools and contract dairying has created much interest. Considerable interest was aroused approximately 5 years ago in the midwest when a young man by the name of Carroll Morris of Meservey, Iowa, instituted a cow pool called Fashion Farms. This pool consisted of a $250,000 physical plant on a 15-acre tract of land in central Iowa, in which facilities were made available for dairymen to submit their cows to this pool to be milked by contract. The expenses of feeding, handling and milking the cow were deducted from the milk sold, with the net returns being forwarded to the owner. A Grade-A milk market was established by shipping the milk from the pool to Kansas City. This resulted in a better price for the milk than the dairymen had received on their own farms, since many could not finance the necessary physical plant for the production of Grade-A milk.

Photograph showing bottom view of construction of an individual calf stall.

The pool was built to handle about 800 cows. Mr. Morris soon became acquainted with many problems that he had not anticipated. First, many of the cows submitted were not high-producing cows, and frequently were from herds where no production records had been kept. Thus, some dairymen found their checks were very small after expenses had been deducted. In some cases, dairymen were in the red. On the other hand, productive cows returned a reasonable net for their owners. In a short time, Morris changed his contract. He no longer accepts dairymen's cows and now uses investors' cows only. In other words, he takes money from investors and purchases cows for the pool. Morris reports that the net return will vary from 5% to 10% interest on the money invested. The pool is still operating and appears to be doing a satisfactory job. Mr. Morris also now leases cows to others.

Two other so-called pools have been started in Iowa. One similar to Fashion Farms is located at Waukon. It is owned by Mr. Bob White. This pool handles about 300 cows and also appears to be performing a satisfactory job, although it is understood that the manager is contemplating a change from dairymen's cows to investors' cows. A third cow pool is located at Montrose. This one is small and is operated very efficiently. It has a capacity for about 300 cows. The cows are consigned only on a herd basis. They are maintained and managed strictly on a herd basis, and are not allowed to intermingle with other cows in the pool. This pool now is leasing dairy cows and other types of livestock back to farmers.

There have been other pools in different parts of the United States with some of them falling by the wayside for various reasons. However, the establishment of these

pools, and the increased number of larger dairy herds similar to those in California, should create considerable interest for the large animal practitioner who is interested in or has a dairy practice. The general opinion of all people connected with the dairy field is that the quality of milk is increasing to a point where all milk in the very near future will be produced to meet Grade-A standards.

Cost of Disease to the Dairyman

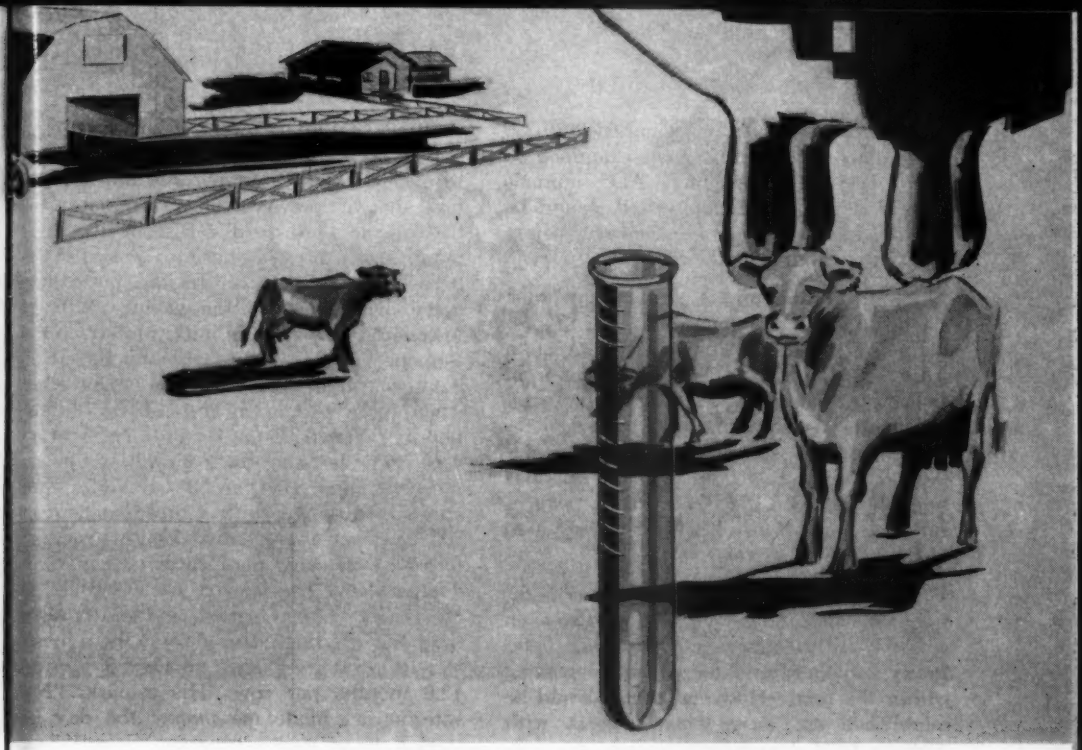
The dairyman has observed the tuberculosis eradication program and recently has been through or is aiding in the brucellosis control program in his state. Now he is confronted with a mastitis control program in many states. He has heard of the gigantic cost of these diseases to dairymen in the United States. He has observed, for example, that the brucellosis control program in a period of 10 years has reduced the cost of this disease to dairymen in the United States from $80 million to $20 million. Consequently, he can see the time when this disease will be nonexistent. He also is aware that mastitis is one of the most costly diseases, estimated to be about $250 million yearly. For the average herd, the cost of this disease will run from $500 to $1,000 per year. There are approximately 75 train carloads of mastitis treatments sold annually at an estimated cost of $25 million to the dairy industry in the United States.

He is aware that the cost of repeat services has been estimated to be around $1.00 per day per cow, and that other diseases such as leptospirosis, ketosis, footrot, parasitism, and minor diseases take a terrific annual toll from his herd. As a result, he desires to utilize veterinary service to the utmost. The task is for the veterinarian in a dairy practice to meet this challenge. In order to do this, he must be aware of many of the problems of milk production. He must be aware of the value of good breeding, such as is available from artificial insemination, which, if properly handled, is one of the greatest disease control measures brought to dairymen in many years. He must be conscious of nutritional problems on the average dairy farm. He must be cost-conscious, and must know that the estimated cost of maintenance of a cow during the dry period will be about $8.00 per month in some areas. The estimated cost of raising a calf to weaning age will cost between $20 and $30, and the estimated cost of raising a heifer to replacement age will vary from $250 to $350 in the midwest. The veterinarian should have a knowledge of the estimated production cost of 100 lb. of milk in his area. Based on present prices, the average net profit from a cow producing 400 lb. of fat and 10,000 lb. of milk will be in the neighborhood of $200 over feed costs. This will yield $70 to $80 for the labor involved in the production of milk. A practitioner must have a knowledge of these costs in the herds he is servicing if he is going to do a creditable job in setting up a herd health program for the dairyman who is trying to meet the challenge of milk production today and in the future.

Herd Health and Preventive Medicine

In view of these statements and an awareness of the changes that are occurring in the dairy industry, it appears that a definite program and the maintenance of herd health must be set up and established by both the dairyman and the veterinarian so that anticipated goals can be reached. A number of veterinarians have set up some type of a contract service for various dairymen, based on a price of so much per cow per lactating month or a percent of the net income from the herds, while others have taken their charges from an increased level production from a certain point. It is not the purpose of this publication to recommend or condemn contract veterinary service. However, it is the purpose of this article to bring to veterinarians in dairy practice the value of a herd health program based on the principle of preventive medicine.

In order to develop a program incorporating these principles, the following could be employed. The herd owner and the



veterinarian can go over the herd operation, calving record, feed costs, milk production, mastitis incidence, footrot, bloat, ketosis, milk fever, and other costs of the previous year. Then a systematic program should be arranged on paper for the coming year. Naturally, a dairyman on such a program must not only be on a production testing program, but also must keep very accurate records of all phases of his operation. Unless a dairyman is maintaining records, such a program is very difficult to evaluate.

Specifically, the program could be set up as follows:

Brucellosis and Tuberculosis. Calfhood vaccination of all herd replacements and an annual testing program for tuberculosis and brucellosis must be established. The veterinarian and the herd owner must also contemplate the necessity for a leptospirosis vaccination program if they deem it necessary. The control of these 3 diseases is fundamental.

Mastitis. A mastitis program is essential in the efficient dairy herd. This consists of a periodic check of the entire herd, using both bacteriological and chemical tests and a physical examination of the cow. The milking process, milking machine, housing and overall management program of the herd must be considered. This will be one of the most exacting programs necessary in the dairy herd.

Parasite Control. Periodic inspection and necessary treatment for all internal and external parasities should be considered in the program. This is a phase of disease prevention that is sadly neglected in many herds.

Reproduction. The veterinarian and the herd owner should ascertain the value of using natural service or artificial insemination. Veterinarians in dairy areas are aware of the value of artificial insemination, whether it comes from a commercial bull stud or from a bull kept within the herd, as far as disease control is concerned. This most certainly should be considered in the entire herd health program. If natural service is used, thorough health checks should be given the bull.

All cattle should be examined 20 to 30 days after calving and then re-examined 30 to 60 days after breeding. Also, animals bred over twice and not settled should be examined and treated, if necessary, before the third breeding takes place.

Calf Production. A veterinarian must establish a program for profitable calf production in the herd. This may necessitate a definite program of removing the calf from the cow after it has been dropped in a sanitary maternity stall, and then moving it to individual calf stalls where supplemental heat and milk replacers are used. This has been shown to be the most efficient way of calf production if losses have been a problem in the herd in previous years.

Periodic Herd Inspection. Other additions or subtractions may be added to such a herd health program, depending upon the type of herd and the problems existing within the herd. However, these should be established on a systematic basis with periodic herd inspections.

Many veterinarians are setting such a program up on a definite fee basis that has been prearranged, charging extra for emergency calls and drugs. Charges naturally vary for this type of service. One veterinarian charges $6.00 per cow per year; another charges on the level production over a certain level; another charges a set fee for all services including emergency services. Regardless of the type of program set up, as far as the fee basis is concerned, the main program that should be of value to the dairymen is a herd health program based on preventive medicine.

What can be gained by such a program? In the first place, the dairyman should be aware of the increased production level in his herd by such a program; the decreased incidence of mastitis; shortened calving interval; fewer cows going to market because of disease; and a lower morbidity and mortality loss in the entire herd. In one program that has been set up, the dairyman noted that his drug bill for mastitis dropped from $316 to $21, and his milk production increased 15 percent. In another herd of 110 cows, the calving interval was cut down from 17 to 14 months the first year. The owner of this herd estimated his savings on this alone amounted to over $5,000. One Guernsey breeder figured that his preventive health program for his 70-cow herd paid for itself the first month, when his veterinarian vaccinated the herd for leptospirosis. In the meantime, every herd owner in the vicinity suffered losses from abortions in milk production before the disease was brought under control. Another small Jersey breeder found that when his veterinarian recognized a phosphorus deficiency, the estrus identification became easier and the conception rate in the herd improved from 53% to 73%. Still another dairyman, with a breeding herd of 200 cows on a preventive health program, found by checking his records that his production level had moved from 360 lb. to 450 lb. in a 5-year period, and at the same time his calving interval on a herd basis had dropped from 14.8 months per cow to 13.6 months per cow. His remark, "My veterinarian made me money the day he started me on such a program," is sufficient testimony for the value of preventive medicine on a herd basis.

Dairying is a highly specialized business and needs all the resources available to make it pay good dividends. One of the essentials is to prevent disease before it starts. The dairy herd, whether it consists of a large or small herd, will need better veterinary service than has been experienced heretofore. As the quality of the cow increases, the quality of the entire dairy program increases, and this can be accomplished only through good veterinary service. In order to cope with the changes that are taking place in the dairy business, the veterinarian must be conscious of these changes, and at the same time must equip himself to cope with the problems of breeding, feeding, management and a preventive disease control program. Cow pools and other changes are innovations bound to come with the changing agriculture. Dairying is definitely a business, a highly efficient business. If the veterinarian is totally aware of the economics involved in such a business, he can better adjust himself in his practice to the position of offering a tremendous contribution to this particular livestock enterprise.

Mastitis Control Programs

Mastitis control, an important part of any dairy herd program, is paying off where diligent efforts are being put forth.

In Iowa, a team composed of John B. Herrick, extension veterinarian, Donald E. Voelker, extension dairyman, Earl Wright, extension dairy industry and Vernon Meyer, extension agricultural engineer, organized an action for the county level involving all segments of the dairy industry. To date, the program has been introduced into several counties and the "team" has presented its action program to different segments of the industry throughout the state.

More interest in mastitis control than has ever been generated before has been observed in Iowa. Milk adulteration from mastitis treatments in Grade A herds has been prevented. Veterinarians report that they have more and more herds that have adopted mastitis control programs. Several counties are contemplating an entire county program during the coming months.

In Wisconsin, 20 demonstration herds are proving the results that can be achieved with a mastitis control program. After two years of observation, Dr. Wayne Thompson, University of Wisconsin extension veterinarian, reports that the demonstration herds definitely have less mastitis and that management recommendations are producing dividends in better milk production.

Cows in these herds averaged 413 lb. of butterfat yearly when the program started. During the first year, butterfat production increased an average of about 40 lb. per cow. In the second year, there was another slight increase. Treatment costs are lower, milk is of better quality and the productive life of cows is longer.

There is nothing new or different about the program being used in Iowa and Wisconsin, but Dr. Herrick of Iowa State University summarized current thinking when he said, "Mastitis control is fundamental in profitable dairying. Where there is a real desire to control mastitis, every dollar spent on a preventive program can be expected to return $500."

MASTITIS CONTROL PROGRAM

Mastitis can be controlled by a continuous, sound program in each dairy herd. This is essential if losses are to be reduced to a minimum. The veterinarian and the dairyman must plan a program that will meet the needs and is specifically designed for each herd. However, there are certain general principles of mastitis prevention which must be practiced. All mastitis control programs are basically the same, but the following program is offered as an example to serve as a guide in planning a specific program.

Herd Management

1. Provide ample size stalls for each cow. There are various ways to determine the correct stall platform for each cow. One method is to measure the distance from shoulder to tail setting and add 3 inches to this for length. The platform width should be about 80% of the length. The chart below gives proper sizes of stanchion stalls and tie stalls for various size animals.

The stalls should be large enough to allow the animal to lie down comfortably with her udder well up on the platform. Loose housing is another method of handling a dairy herd. Unless properly managed, however, this method can be a source of considerable mastitis trouble.

2. Keep the stable floors and gutters dry and clean. The use of liberal amounts of lime or super phosphate aids in controlling excess moisture. The cow platforms should be disinfected at frequent intervals and always done when a cow is moved to another stall.

3. Use plenty of bedding when the cows are kept stabled. Chronic mastitis is often caused by the cow's udder resting on unbedded, filthy platforms.

4. Protect udders and teats from injuries and wound infections. Crushed teats send many good producers to market as beef.

5. Avoid the use of teat plugs, tubes and injections as much as possible.

6. Cows in heat should be kept isolated from the herd.

7. Allow an adequate dry period be-

Sizes of Cow Stalls - Using Electric Trainers

Weight of Cow	Girth of Cow	Stanchion Stalls Width	Stanchion Stalls Length	Tie Stalls Width	Tie Stalls Length
800 lbs.	65"	3'-6"	4'-8"	4'-0"	5'-2"
1000 lbs.	70½"	3'-9"	5'-0"	4'-3"	5'-6"
1200 lbs.	75"	4'-0"	5'-4"	4'-6"	5'-10"
1400 lbs.	79½"	4'-3"	5'-8"	4'-9"	6'-2"
1600 lbs.	84"	4'-6"	6'-0"	5'-0"	6'-6"

tween lactations. Move dry cows to a separate area away from the milking herd.

8. Keep barnyard, holding areas, feeding areas and lanes free of mud and debris. Door sills and approaches must be low to prevent trauma to the udder. Paved areas around the barn have many advantages over dirty, muddy yards and make it easier to produce quality milk.

9. Train heifers to the stable routine before they freshen. Test when they begin production.

10. If aged cows are purchased, segregate and test before adding to the milking line. The best sources for herd replacements are those raised on the farm.

Milking Procedure

1. The first step in alleviating widespread subclinical and chronic mastitis is to make certain that the milking machine is in proper working order. Milking vacuum that is too high, too low, or fluctuating may be the fault of the pump, height of the line or number of units being used. Follow the manufacturer's directions regarding vacuum and pulsations. Narrow bore inflations reduce tissue irritation and damage from creeping.

2. Set up a definite milking order with heifers first, older cows next and known or suspected cows last. Use a separate unit for cows with mastitis. This is very important in preventing spread of disease.

3. Wash off the udder with a single service towel dipped in a warm (120 F.) antiseptic water. Massage the udder for 30 to 45 seconds.

4. Test each quarter with a strip cup before each milking.

5. Attach the machine within 1 to 3 minutes after preparing the cow.

5. Milk thoroughly but do not overmilk. Remove each teat cup individually as soon as milk flow ceases.

6. Milking should be done regularly and by the same person. Generally speaking, one man should not operate more than 2 units. The important rule is not to overmilk.

7. After milking, dip the lower ½ of each teat in a disinfecting solution. This is very important to prevent spreading of disease and has proved to be a great aid in controlling outbreaks.

8. Dip teat cups between each cow first in lukewarm water, then in a sanitizing solution. They should stay in contact with the solution from 30 to 60 seconds.

9. Rinse all equipment immediately after using, brush-wash in an alkaline cleaner and again rinse in 160 to 180 F. water.

10. Between milkings, store rubber parts either in a clean, dry place or on a lye rack filled with 0.5% lye solution.

11. Sanitize equipment before use at next milking.

12. Use 2 sets of inflation rubbers and hoses, alternating each week. Soak the alternate set in a 5% lye solution.

Recognition and Treatment

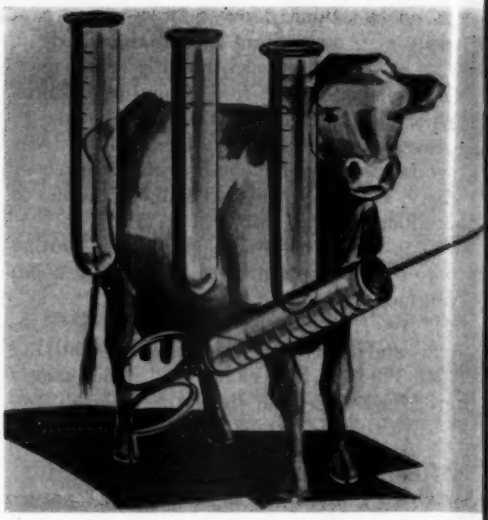
1. Examination of the udders of lactating cows should be done once or twice a year. This can be performed when milk samples are drawn for a bacteriological examination.

2. Laboratory examination of a milk sample from each quarter is done to determine which organisms are present and their sensitivities.

3. Test each cow periodically to know her mastitis status. The CMT will reveal an increase in number of body cells in the milk, and increasing alkalinity which indicates an irritation to the udder. Observations from this test should be recorded on a master sheet. This will enable the dairyman to detect mastitis in the early stages and to locate quarters affected with chronic mastitis. This will provide convincing evidence that subclinical and chronic mastitis exist to a greater extent than previously realized by the herd owner. The test serves as a means of evaluation of the udder health, and changes in management and therapeutic agents used to treat mastitis.

4. Treatment must be coordinated with sanitation and careful milking. Acute cases must be treated immediately, but dry treatment is the most effective method of eliminating certain organisms. It requires fewer drugs, no milk is discarded and no adulteration of human food occurs.

Certain Aspects of Rumen Nutrition



Abstracted from the Fourth Annual Symposium on Therapeutic Nutrition for Veterinarians Held in Indianapolis, Indiana, March 1961.

Great advances have been made in ruminant nutrition during the past 15 years but we would be very conservative if we said a great deal of progress has been made. We are today at about the same place in ruminant nutrition that monogastric nutrition was roughly 50 years ago. We have indeed made great strides. In reality, however, we have barely scratched the surface. We have come to the realization that digestively, the rumen of this class of livestock is probably the important key in their well-being and nutrition.

Carbohydrates: The ruminant is primarily a roughage consumer, but we have been trying to make a monogastric out of the beast. It takes more skill, apparently, to make good hay than it does to make up rations by other means. Today there are certain so-called unknown factors which seem to be present in hay and in silage. These factors will be resolved sometime, but at the present time let it suffice to say that ruminants seem to do considerably better with good roughage than they will with almost any other type of ration. Therefore the energy of the ruminant should be basically hay. A cow will consume as much as 3% to 3½% of her body weight in excellent hay daily, but only 1% in poor hay. If the hay were exceptionally good, the majority of the energy could come from this source, but unfortunately, good hay is rarely available.

Since this is the case, all of the deficiencies of this hay must be made up. It doesn't make a great deal of difference where this energy comes from, whether from corn or other cereal grains. It is relatively apparent that animals can use the starch from any cereal grain for their own energy. More

discretion must be used if one is going to feed corn or wheat to dairy cows that are producing well. This is particularly true if we are going to replace oats, because oats are usually relatively high in fiber and people feed by measure and not by weight. As a result, many of the so-called difficulties that arise seem to be simply a matter of misjudgment, not a problem of the feed itself. Take for example, oats and corn on standard weight bases. Oats generally weigh 32 lb. per bushel, corn 56 lb. It does not take a great deal of calculation to appreciate the fact that the same volume of corn would provide just short of twice as much energy as would oats.

Protein: The type of protein fed to ruminant animals is of little concern since the cow is primarily concerned with the level of protein and not with the type of amino acid present. Ruminants have a tremendous capacity, through the aid of rumen microflora and microfauna, to take the simplest of nitrogen compounds and convert them into protein that will serve for their body maintenance, growth and nutrition. These animals can get along beautifully on some of the simplest of rations, but no one will give them that opportunity. The level of protein required by animals of course, will be dependent on what they are doing and in addition, on what type of roughage is being fed.

Vitamins: Many of the difficulties encountered with vitamin A theoretically, are not practically vitamin A problems. There is a great deal that we do not understand about vitamin A. Vitamin A deficiency has become a convenient handle upon which to hang a number of unexplainable difficulties. More work definitely needs to be done. The suggestion that nitrate may interfere with the conversion of carotene to vitamin A needs critical and rather rapid investigation. There have been herds of cattle that have shown classical vitamin A deficiencies on rations made up primarily of excellent corn silage. Normally, these rations should not have any problem with a vitamin A deficiency. In addition, cattle have responded to vitamin A therapy under these conditions. This problem, however does not present itself if excellent legume hay is fed. This also, does not indicate that we should not utilize corn silage because it is one of the cheaper and better feeds we have. We must learn to cope with this type of situation, if indeed the situation exists.

Vitamin D on the other hand is unlikely to be a problem in cattle that are managed outdoors. Indoors, this may be a rather severe problem, if the animals are not fed sun-cured hay. If either of these problems should present themselves, most commercial rations today are fortified with both vitamin A and D since both vitamins are readily available and quite economical. It may be well to feed a fortified feed, particularly during the winter months, if for no other reason than for the insurance that these vitamins will be provided. It is also an accepted fact that most animals can be harmed by excessive feeding, but more serious than this would be the danger of relying on these vitamins as a cure-all for every malady that occurs in animals. They are important parts of a ration but they are not the entire answer.

All other vitamins at this time seem to be adequately provided under normal conditions. There are certain conditions when animals are severely off feed. After treatment with sulfa drugs or comparable materials, B-complex vitamin therapy may be indicated for bringing the animal back on feed in a shorter time.

Minerals: Minerals in rations are critically important. Calcium, phosphorus and salt are the ones generally known to be essential. Other minerals, especially the trace minerals, must be considered, because even though symptoms are not apparent, mineral deficiencies may indeed be slowing down production, reproduction and growth in animals. It seems apparent that as far as the mineral content is concerned, ruminants do not vary much from monogastrics. In monogastric nutrition it has been quite well shown that certain subminimal mineral levels have caused some difficulty in getting the best out of the livestock.

Calcium has been highly overrated as a mineral because except for rare cases, ruminants well fed on high-roughage rations will actually have more calcium than

may be desirable. Over the years data have accumulated to show that animals consuming largely hay, whether this hay is legume or grass grown on soils that will produce legume, will have adequate amounts of calcium. Furthermore, phosphorus may become deficient because of an excess of calcium. Rarely is it necessary to add additional calcium to the ration with the exception of the animals on a high grain ration or a high corn silage ration.

Phosphorus is the one major mineral that is most grossly underfed. The common sources are either dicalcium phosphate or steamed bone meal, as well as a number of others such as defluorinated rock phosphate, cuneo phosphate, etc. But all of these compounds contain calcium as well as phosphorus.

Salt should always be provided. It is better to provide the animal with a supply of free-choice minerals than to add a fixed amount to the ration. It seems apparent that there is probably a great variability in animals physiologically and metabolically, so that their requirements for the various nutrients will also vary accordingly.

Recently, a considerable amount of discussion and writing has been done on the use of antibiotics in rations for ruminants. They have not shown very conclusive results under most conditions. There are exceptions, such as a beef steer that is coming onto feed or a young calf, but probably the weakest evidence now available is for the dairy animal in full lactation. It seems more logical under these circumstances that if antibiotic therapy is indicated, it should be used at therapeutic levels and not as a preventive.

Various tonics and sundry preventives that are on the market for bringing animals on feed, for keeping them on feed, for giving them a bloom, etc., are of doubtful value and generally not required. One of these is the use of green forage during the winter. Research to date has shown that animals eating living material, dry material or ensiled material will get along equally well. One of the major problems is not generally what we feed our animals, but more realistically, how much. The old saying "the greatest disease in livestock in this country is hollow gut disease" holds true. This is exemplified particularly in brood ewes, for there is a high incidence of pregnancy disease or lambing paralysis as well as ketosis in cows. Ketosis or pregnancy disease is a metabolic, physiological malfunction which seems to hinge primarily on a fundamental lack of readily available energy at the time of stress.

Future Research: In the next few years we will see a considerable amount of research work in the areas of nutrition. The first is minerals. There will come a time when it won't be adequate to say we can just provide minerals and the animals will take care of themselves. In other words, it won't be a matter of providing calcium, phosphorus, cobalt etc., but each mineral will probably be dependent on the level of other minerals already present. It probably won't make much difference where we begin, so long as we use one for a reference point.

Another area of investigation in ruminants is that of the role of protozoans in digestion. It has been generally accepted that protozoans are there for the ride, but is rather interesting to note that when the animal is doing well, one usually finds a large population of protozoans whereas, when the animal is not doing well on forage rations, usually the protozoan population is very low. There seems to be some indication that the utilization of protein will be somewhat better if the protozoans are multiplying rapidly.

There are a number of things that are still unknown. Such things as the effect of pelleting are not completely understood, also the rate of feeding as well as the frequency of feeding animals. Recommendations made in the 1890's are being used today in the feeding of cattle. This is particularly true in the case of beef cattle where the statement was made that feeding one, two, or three times a day didn't really make much difference. Today's research will show that more frequent feeding appears to have some definite advantages. With the need for more and more red meat, it seems this may be a critical point.

Clinical Observations on Novobiocin for Staphylococcus Mastitis

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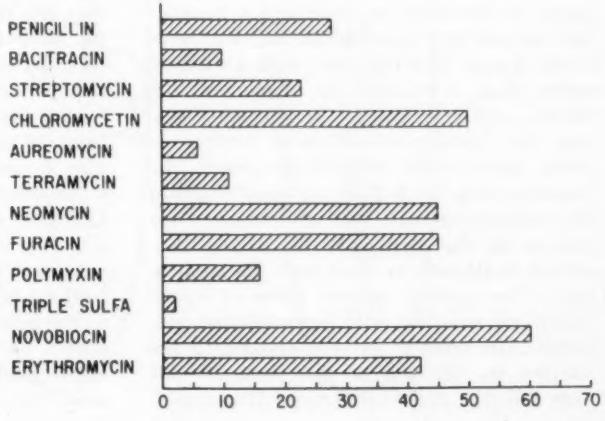
It has been our experience that penicillin alone has become increasingly ineffective in the treatment of bovine mastitis, particularly cases of a chronic nature. Out of this experience, we have begun to use penicillin in combination with other antibiotics. Penicillin and neomycin heretofore have proved fairly satisfactory, but this combination falls short in those instances of prolonged or chronic staphylococcus mastitis.

An antibiotic combination containing prednisolone, novobiocin acid sodium, neomycin sulfate, procaine penicillin G, and dihydrostreptomycin sulfate was used on 66 cases of mastitis. These cases were selected with an eye to avoidance of udders which had much scar tissue, but were chronic mastitis cases.

Sensitivity tests were run on milk samples from staphylococcus-infected quarters, some of which were hemolytic staphylococci. Eleven other antibiotics were compared with novobiocin on these plates, and the cultured microorganisms proved sensitive to this drug in 60 out of 66 or 90.9% of the cases sampled. See accompanying graph.

Following the sensitivity testing, clinical trials were begun and in cases where the drug was indicated, the animal was given 2 or 3 infusions of the antibiotic combination under study at 24-hour intervals. Approximately 75% of these cases cleared and were negative on the next milk sample taken 3 weeks later. The other 25% were retreated and about 5% of these responded to this repeated therapy. This combination [penicillin, novobiocin, neomycin, dihydrostreptomycin, and prednisolone in a free-flowing suspension, (Tetra Delta, Upjohn Co.)] has given the best anti-inflammatory response in our practice.



Comparative sensitivity to novobiocin and other antibiotics in the 66 staphylococcus mastitis cases.

New Non-Penicillin Intramammary Infusion Product

V. M. editors summarize clinical data supplied by Hardin E. Gouge, D.V.M., Director of Pharmaceutical Research, Research Laboratories, St. Joseph, Mo.

Introduction of intramammary infusion products, a common occurrence in the era of penicillin formulation, slowed to a trickle after the milk residue scare several years ago. Clearance of today's F.D.A. regulations by a new antibiotic udder infusion constitutes news. Neo-Pac Aerosol (Research Laboratories, St. Joseph, Mo.), a new nonpenicillin infusion product, recently cleared after extensive testing.

It incorporates an entirely new packaging development, consisting of a pressurized aerosol container supplying 10 therapeutic doses. It is equipped with a metered valve that automatically dispenses the proper (2.5 cc.) dose. The metering system has undergone extensive testing to prove that it will consistently supply the proper dosage each time. Pressure within the container is sufficient only to cause expulsion of the medicant. No air or propellent is allowed to enter with the medication. Ten sanitary plastic tubes or applicators are supplied with each 10-dose container. An infusion tube is applied to the adapter on the top of the container for each infusion and is destroyed after use.

Each dose supplies 250 mg. of dihydrostreptomycin, 100 mg. of neomycin sulphate, and 71,000 units of polymixin-B in an aqueous dispersible base. Conservative therapeutic claims reflect current thinking on udder infusion therapy. However, critical review of clinical data reveals effectiveness against the common udder pathogens, streptococci and staphylococci.

Clinical Study

A total of 164 quarters of 41 milk cows from 3 herds with a history of mastitis were examined clinically. The leucocyte and bacterial content of milk samples from these quarters was determined. Forty quarters were classified as being infected and were treated. At 12-hour intervals, 29 of these quarters were given 2 doses. Eleven quarters were infused with 1 dose. Eight of these 11 quarters previously given 1 dose were infused with 3 doses at 12-hour intervals 17 days after the initial treatment.

Samples of the milk from all treated quarters were examined for leucocyte and bacterial content at 0, 24, 48, 72 and 120 hours post-treatment, and at 17 days on the 11 quarters given 1 injection.

Results: The results of this experiment indicated that, after 120 hours, 93.1% of the streptococcus infections and 42.7% of the staphylococcus infections were eliminated by treatment. It was also observed that the use of 1 dose eliminated 100% of the streptococci and 20% of the staphylococci in 11 quarters for the 17-day observation period. One hundred-twenty hours following the last treatment, the milk samples from 29 quarters, which had been infused with 2 doses at 12-hour intervals, showed a reduction of 88.2% of the streptococci and 41.6% of the staphylococci. At 120 hours, after the last of 3 treatments, there was a reduction of 25% of the staphylococci infections in 8 quarters that did not respond to the 1-dose treatment given 17 days previously. This is a 40% elimination of staphylococci and 100% elimination of streptococci when the 1-dose recovery is included.

Suturing Technic for Neglected Teat Wounds

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Phillips, Wisconsin

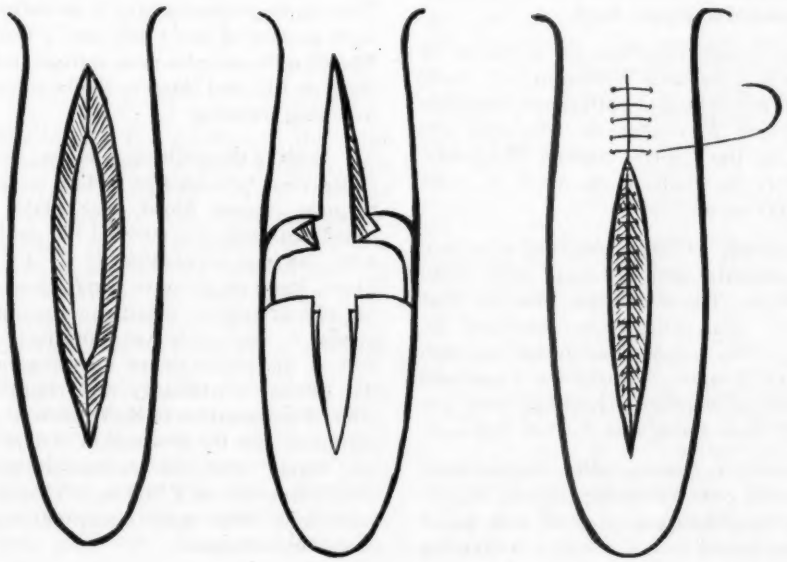
When the wound is fresh, suturing teats that have been cut into the teat cistern is no real problem. However, many times we are called to suture teats that have been neglected for several days. In these cases, granulation tissue has already formed.

The following technic is used in our practice to suture these cuts and obtain permanent closure of the wound. The edges of the wound are débrided with a sharp scalpel. A V-shaped cut (See Figs. 1 and 2) is made between the epidermis and the mucosal lining of the teat canal to remove the granulation tissue and expose tissue which will heal. The mucosal layer is closed with simple interrupted 00 catgut sutures and an antibiotic powder applied to the wound. Then the dermal layer is closed with simple interrupted fine Vetafil sutures (Fig. 3).

A plastic teat tube is then put in the teat and the cap removed. This allows the milk to flow out constantly, preventing pressure from developing on the sutures due to an accumulation of milk in the teat cistern.

Neglected teat wounds that extend into the teat cistern have healed satisfactorily when managed in this manner and mastitis has not been a problem. The Vetafil sutures and teat tubes are removed in 7 to 10 days.

Fig. 1. Illustrated from left to right. Left—the wound is debrided. Center—showing V-shaped cut between epidermis and mucosal lining. Right—showing how layers are sutured.



Bovine Mastitis Caused by Pasteurella multocida

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P. M. O'Connor, D.V.M.
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Pasteurella multocida has been reported infrequently as the causative agent of bovine mastitis. Several individual cases have been reported by Tucker, Schlotthauer and Packer and Merchant.[1,2,3] In 1954, Barnum described a herd outbreak of mastitis caused by this organism which involved 30 quarters in 14 cows of a 20-cow herd.[4]

This report describes an outbreak of mastitis in a southern Wisconsin dairy herd in which the principal pathogenic organism involved was *P. multocida*. The case was referred to the Central Animal Diagnostic Laboratory in Madison on April 17, 1961 by Dr. O'Connor.

Diagnosis: Fifteen cows out of a herd of 40 animals were affected with clinical mastitis. The California Mastitis Test (C.M.T.) was utilized as described by Schalm.[5] This test was conducted on each quarter of 11 cows, 2 quarters of 1 cow and 3 quarters of another. Readings were not obtained from 1 dry and 1 fresh cow.

Prior to obtaining milk samples from the affected cows for bacteriological examination, the udders were washed with paper towels saturated with a solution containing a chlorine disinfectant (200 p.p.m.) Immediately before drawing the milk samples the teats were swabbed with 70% alcohol, then about 10 ml. of milk were drawn from individual quarters into sterile cork-stoppered vials. Milk was collected from all of the quarters from which California Mastitis Test readings were obtained, as well as from each quarter of the 1 dry and 1 fresh cow. The 57 milk samples were refrigerated overnight at 7 C. and taken to the laboratory the following morning.

Each of the milk samples was aseptically streaked on a quarter surface section of a tryptose human blood agar plate (Difco blood agar with 5% citrated human blood). After aerobic incubation at 37 C. for 24 hours, these plates were carefully examined for characteristic mastitis-producing organisms. *P. multocida* was tentatively identified as the predominant microorganism by its colonial morphology and characteristic odor. Fermentation of dextrose, sucrose and mannitol with the production of acid but no gas, along with the microorganism's inability to grow on EMB agar (Difco eosin-methylene blue agar) substantiated the above identification.

The other microorganisms present such as Staphylococci, Streptococci and Coliforms were identified on the basis of colonial morphology, IMVIC pattern[6] and ability or inability to grow on BAP or EMB agar plates.

P. multocida was recovered from 24 of the 57 quarter samples collected. Nine of the 15 cows were affected with this organism. Staphylococci, Streptococci and Coliforms were isolated from 17 of the milk samples and 16 were negative.

The bacteriological results along with the corresponding California Mastitis Test readings are recorded in Table 1.

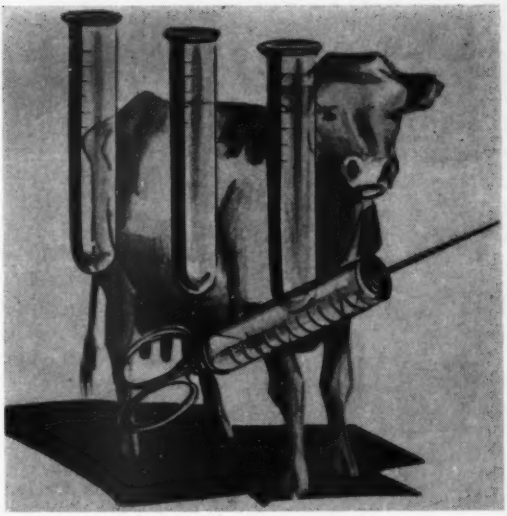
TABLE 1

Bacteriological Results and California Mastitis Test Readings

Microorganisms Recovered	No. of Quarters	California Mastitis Test Readings of Quarters				Not Tested
		+3	+2	+1	0	
Pasteurella multocida	24	20				4
Staphylococci	6	1	3	1	1	
Streptococci	4	3			1	
Staphylococci and Streptococci	2	1	1			
Coliforms	2	2				
Streptococci and Coliforms	1	1				
Staphylococci and Coliforms	2	1	1			
None	16	4	1	3	4	4

Discussion: The mastitis in this herd was largely a result of poor milking procedures and sanitation. There was no clinical evidence of any other disease affecting these cattle. Rinsing the milking equipment in a sanitizing solution prior to milking the cows had been discontinued several months previously because of possible interference with cheese manufacturing.

The prognosis in this herd was rather poor. Treatment of the affected cows with systemic and intramammary antibiotics and sulfonamides was relatively unsuccessful. A *P. multocida* bacterin was used. The milking procedures and general sanitation measures were improved. However, clinical recovery from mastitis was very slow in the animals from which *P. multocida* was recovered and 4 of these cows were eventually sold.



Summary

An outbreak of clinical mastitis in a herd of 40 cows is described in which the principal pathogenic organism was *Pasteurella multocida*. The mastitis was largely the result of poor milking procedures and sanitation. Recovery of affected cows was slow and 4 were later sold as a result of the infection.

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CLINICAL ABSTRACTS

Novobiocin in Treatment of Staphylococcus Mastitis. Clinical cures followed in 23 out of 24 staphylococcic infected quarters treated with novobiocin while only 19 out of 25 were cured with a combination of penicillin and streptomycin. Clinical cure was assessed to have taken place if the quarter remained normal for 30 days. Staphylococci from 47 of the 49 quarters were checked for sensitivity. Only 4 were sensitive to penicillin and 45 to streptomycin.

The Vet. Rec., 73:965, 1961

Production Records Under the New York State Mastitis Control Program. This program was established in 1946 and was based on the belief that a veterinarian could go into a dairy herd, conduct a physical examination of the udder and, by observation of the management practices and general sanitation, be able to make recommendations that would enable the herdsman to minimize his mastitis problems. A study of the production records of 71 herds under this program showed that there was an increase in rate of production from 3% during the preprogram period to 8% during the period under the control program. The average annual production per cow in the 71 herds during the preprogram period was 10,580 lb. as compared with 11,462 under the program.

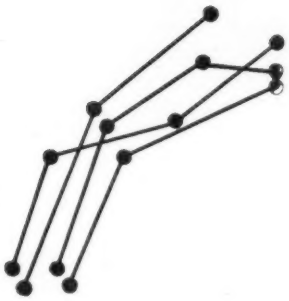
Cornell Vet., 51:588, 1961

Coliform Mastitis in Cattle. Among the peracute mastitis cases seen at the Ontario Veterinary College clinic during a 3-year period, 70% were caused by coliform bacteria. Most of these were *E. coli,* but a few were *Klebsiella* spp. and *Proteus* spp. More than 50% were in cows that had recently calved. Also, more cases appeared to occur during the period the animals are stabled, indicating that exposure of the teats to bedding, manure and stable floors is the route of infection. Occurrence at or near parturition and symptoms of toxemia should arouse suspicion of this type of mastitis.

Good results of treatment have been obtained using 2 mg. per lb. of oxytetracycline I.V. This should be combined with isotonic electrolyte solutions when there is a toxemia, and when the animal is suffering from shock. A mature animal is given 4800 cc. of isotonic electrolytes I.V. at 24-hour intervals or more often if necessary. If a severe enteritis is present also, oral sulfonamides should also be administered. Twenty to 30 units of purified oxytocic principle are given I.V. to evacuate residual milk and inflammatory debris. Poor response to P.O.P. will indicate extreme toxemia and a poor prognosis. Intramammary infusion of 426 mg. of oxytetracycline has given favorable results. This is repeated every 24 hours for 2 or 3 treatments.

The Canadian Vet. Jour., 2:401, 1961

PET PRACTICE



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References: 1. York, C. J.; Bittle, J. L.; Burch, G. R., and Jones, D. E.: Vet. Med. *55*:30 (April) 1960. 2. York, C. J., and Burch, G. R.: J. Am. Vet. M. A. *138*:298 (March 15) 1961.

*Trademark for CANINE DISTEMPER VACCINE, Modified Live Virus, Chick Tissue Culture Origin, and INFECTIOUS CANINE HEPATITIS VACCINE, Modified Live Virus, Porcine Tissue Culture Origin, Combined, Vacuum Dried.

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Suppression of Estrus in Cats

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Cats belong to a species in which estrus may persist for weeks until follicle rupture occurs through mating (incomplete cycle). If mating is prevented, estrus may produce very unruly forms of behavior, *e.g.* excessive mewing, crying, purring, rolling, turning and dashing around, and refusing food. These typical symptoms pose a special problem in pets such as cats, but are of lesser importance in other animals with a similar pattern of an incomplete cycle.

Over a period of 2 years we have applied medroxyprogesterone acetate (Provera, Upjohn Co.) for the suppression of estrus in 20 cats. The rationale for the use of this progesterone derivative was the exceptionally long duration of its effect (up to 6 weeks), its easy tolerance and the absence of any side-effects. The preparation is active in all breeds of cats, including Siamese cats.

Treatment: The dose recommended is 5 mg. Provera per day given orally. Within 24 hours the cat is thoroughly quieted and refuses mating. It is, however, recommended to continue this dosage for another 2 to 4 days in order to create a depot effect of 25 mg. medroxyprogesterone acetate which will suppress further estrogen production. A single injection of 25 to 100 mg. medroxyprogesterone acetate is just as effective and has a depot effect which lasts 6 weeks. Estrus returns after the usual interval of 2 to 4 months.

The hormonal effect is evidenced by the size of the uterus but is hardly noticeable in the ovary. Fig. 1 shows the uterus of a cat in estrus compared with the uterus of a cat 10 days after treatment with a single injection of 25 mg. medroxyprogesterone.

Discussion: Suppression and delaying of estrus in bitches has been reported by Bryan[1], who used 17-alpha-acetoxyprogesterone (Prodox, Upjohn) *per os.*

The endocrine mechanism of the estrous cycle provides for 3 possibilities:

1. Incomplete cycle (one stage): Only follicle stimulating hormone (FSH) is produced. LH production can be elicited solely by mating (cats, rabbits, ferrets, voles).

2. Complete cycle (two stages): FSH production is followed by release of luteinizing hormone (LH) which causes rupture of the follicle and corpus luteum formation, thus terminating the estrous period within 1 to 7 days (cattle, sheep, goats, horses, dogs, etc.).

3. Menstrual cycle (three stages): FSH production is followed by LH production and corpus luteum formation. The regression of the corpus luteum provokes a hormone withdrawal bleeding within 14 days (menstruating monkeys, women).

In our experiments the treatment with medroxyprogesterone acetate suppressed the

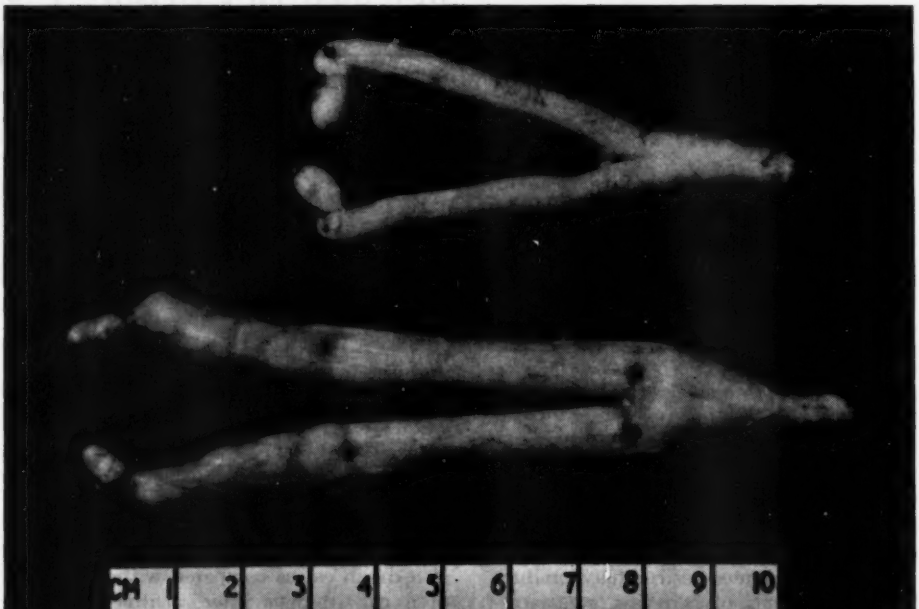

Fig. 1. Top: Uterus and ovary of an estrous cat 10 days after treatment with 25 mg. Provera. Bottom: Uterus and ovary of normal estrous cat.

continuous FSH production in the estrous cat and thus terminated estrogen production within 24 hours. The mechanism of this suppression has been described in 1956 and 1958[2,3] as due to the selective accumulation of the steroid hormone in the acidophile cells of the anterior pituitary lobe which produces FSH. Thus suppression of estrus represents a transient process lasting 6 weeks which does not interfere with later cycles and not even with later pregnancies, if these are desired.

Summary: Estrus can be suppressed in cats of all breeds by medroxyprogesterone acetate. The dose required is 25 mg. given either in 5 oral doses of 5 mg./day or 25 mg. of the suspension in one injection. In rare cases, an injection of 100 mg. is required. The effect of this progesterone ester usually lasts for 6 weeks but is sufficient to suppress estrus until the expected date of the next period that usually follows in 2 to 4 months. The disturbing symptoms of estrus disappear within 24 hours after oral treatment has begun or after the depot injection. Further pregnancies are not impaired by this treatment.

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Observations and notes on equine practice gleaned from 40 years of veterinary experience by A. H. Quin, D.V.M.

Spaying Filly Foals

As riding mounts or for range work under the saddle, spayed mares appeal to many owners. This is especially true for those having a single pleasure mount or to the ranch hand who dislikes working a mare in heat.

Spaying filly foals, preferably from 3 weeks to 8 months of age, is a common practice in the Southwest. It is a considerable source of revenue for veterinarians, with the average fee about $25.00. Fillies can be spayed up to 6 months of age, but the younger the better. Granting reasonable surgical asepsis and rubber gloves, there is no greater risk than in spaying an equal number of puppies.

A liberal area anterior to the right hip bone should be scrubbed clean, shaved and painted with tincture of iodine. The site for an approximate 2½ inch incision is a hand's breadth below the point of the hip and 2 inches behind the last rib. Surgical anesthesia consists of intravenous injection (given slowly) of 10 cc. to 15 cc. of Nembutal. The foal is laid on her left side and an assistant pulls the right hind leg well back out of the way.

Skin and fascia are incised and the underlying muscles separated by blunt dissection. First one, then two fingers puncture the peritoneum, which is then pulled outward to facilitate picking up the ovarian ligament. After the ovarian ligament is reached, the right ovary is grasped and brought to the surface through the incision. Then the right uterine horn is followed to its bifurcation and the middle finger is hooked under the left horn, so that with steady traction the left ovary is brought out through the incision. The ovaries, fallopian tubes and a short length of the uterine horns are cross clamped over a circular tie suture of catgut, then cut away. Or, the severance is accomplished with the heavy serrated shears used in heifer spaying.

The skin is sutured with No. 3 catgut and a fly-repellent surgical dusting powder applied. A prophylactic dose of tetanus antitoxin and long-acting penicillin is routine.

Important: The surgery is not as yet completed, for complete desexing of the filly requires amputation of the clitoris. This is easily accomplished by grasping the tip of the clitoris with a fixation forceps, stretching it, clamping the base and a simple amputation.

Leptospirosis in Horses

There is considerable variance of opinion among academicians as to whether or not *Leptospira pomona* exists as a serious disease menace to our horse population.

The conclusive reports by Roberts of Cornell University, by Jones of the U. S. Army Veterinary Corps and scattered field reports assuredly point out that we cannot disregard the possibility of lepto in equines, whether the causative organism is *Leptospira pomona* or one of many other pathogenic serotypes. While possibly not all of Koch's postulates have been proven, there is ample evidence to incriminate *L. pomona* as an etiological factor in equine periodic ophthalmia or moon blindness. Abortions,

particularly those accompanied by icterus, merit 2 spaced blood tests for confirmation of ascending titers.

Considering the value of blooded horses, it seems to be cheap insurance to keep all breeding stock and growing young stock routinely vaccinated with leptospirosis bacterins.

Equine Rabies

One late afternoon, a farmer noticed an old work mare chasing and biting some cattle in a pasture. He saddled another horse and rode over to chase her to the barn. First thing he knew, the mare charged him and bit his mount viciously over the top of the neck. Being no cowboy, the farmer got up and made a run for the fence. Eventually, the crazy old mare meandered to the barn lot and into the barn in which she was kept.

As suspected, the mare had a typical case of equine rabies with death after convulsions and paralysis on the 3rd day following appearance of symptoms. Laboratory diagnosis confirmed presence of Negri bodies.

Under special permit, the small herd of cattle was trucked to a federally inspected plant for immediate slaughter. The riding mount received an initial 100 cc. dose of phenolized brain tissue rabies vaccine followed by 4 more 50 cc. doses at 2-day intervals. The horse never developed any symptoms suggestive of rabies.

As is true in so many diseases, the typical case of equine rabies poses no great difficulties in diagnosis. It is the early or sometimes atypical case that is fraught with danger. A few of the early symptoms may be mentioned. These include mild colicky pains; twitching of the nostrils and sardonic, spasmodic retraction of the commissure of the mouth; ptosis of one or both eyelids; unequal dilation of the pupils; spasms of the fly shaker skin muscles; frequent urination and defecation; nervous walking and pawing restlessness. As the disease intensifies, there are alternating periods of quiescence and vicious excitement, shrill neighing, charging imaginary objects, biting at the manger, self-mutilation and progressive posterior incoordination. Complete paralysis with gasping and convulsions ushers in the last hours before death.

Pastern Mange

Scabies caused by the mite *Dermatocopter communes* appears most commonly during the winter months, with localization in the region of the pasterns. Itching, stamping, licking and gnawing at the affected parts is noticed even before any skin lesions are visible. This stage is followed by desquamation, crusting, thickening, and finally, corrugations and folds. The mites can be identified by a fairly deep scraping at the edge of the lesions and examination under the low or medium lens of the microscope.

This type of foot scab can soon involve most of the horses in a stable and is readily spread by brushes, currycombs, wiping cloths or other equipment. The affected pasterns should be dressed with a soapy cresol antiseptic and a stiff brush. After drying, apply a 0.25% solution of lindane in neatsfoot oil, a 1 to 10 solution of lime and sulfur dip, or your favorite antiseptic ointment. All grooming equipment must also be disinfected. Thickened folds of skin that remain after all the scab mites are killed can be reduced by a once-daily application of 10% salicylic acid in lanolin.

Umbilical Hernia

It is good practice policy to be in no hurry about reducing an umbilical hernia of a foal. Often the rupture will resolve without medical or surgical intervention by the time the colt is 6 months of age.

One of the old-time nonsurgical procedures for this anomaly is to cast and place the foal in dorsal recumbency, to apply a protective circle of heavy petrolatum within an inch of the hernia's periphery, and then to paint the hernial sac with fuming nitric acid. A swelling occurs, but disappears in 4 to 6 weeks along with the hernia.

Management of Shock and Sepsis

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All Gram-negative bacteria produce one poison that is in the cell body of the bacteria. This poison is known as endotoxin. Bacteria and endotoxin are a combination of a lipo and polysaccharide attached to a protein. When this poison is extracted and analyzed it is found to be the same in all Gram-negative bacteria. *E. coli* protein can be distinguished from a *B. coli* protein, but the general chemical behavior is indistinguishable.

Apart from the localized effects of the infection, the general effect is one of frustration, rapid pulse, fever and collapse of the circulation. The collapse of the circulation is the main feature of the disorder. It begins to develop in a variable period of time. If it is an overwhelming infection, it can develop within hours and kill within hours.

This is called the state of peripheral vascular collapse, commonly known as traumatic shock. You cannot distinguish the broad features of collapse due to this poison, and the broad features of shock due to loss of body fluid.

It is our job as investigators to try to understand how this chemical produces this result and what can be done to counteract it. At the present time, there is no known antidote for the poison.

When the animal dies from this type of poisoning, very little is found in the tissue. Small focal hemorrhages can be seen. In the dog you will be able to see degeneration of the membrane of the intestine. Perhaps hemorrhages will be present in the intestinal wall. The amount of actual damage is not excessive enough to cause death.

The simplest case of traumatic shock is caused by loss of blood. This causes falling blood pressure, rising pulse, absence of urine output and death, if not treated promptly. In treating the patient, hemorrhage is stopped and a blood transfusion given. If the fluid loss is not due to bleeding, but is plasma and tissue fluid as in the case of burns, plasma is used for the transfusion.

The chronically ill or previously injured patient will not respond to blood transfusion. To illustrate this, an experiment was conducted to demonstrate reversible and irreversible shock.

A needle was inserted in the femoral vein of healthy dogs and was attached to a tube, the other end leading into a bottle containing heparin. The height of the bottle was regulated so that the blood pressure was kept at 35 mm. of mercury. All the

symptoms of shock were noted in the animals. At the end of 2 hours, the blood was replaced. Eighty to 90% of the dogs progressed favorably after this experiment.

In another experiment, the blood pressure was kept down for 5 hours. When blood was replaced the blood pressure returned to normal, but went down again and the animals died.

If a healthy dog is given the blood of one of the dogs that died, the healthy dog survives. Although it lives, it is not well immediately. It takes 2 days for the animal to completely recover from the 2 hours of shock. There are metabolic disorders and the defense system against infection is impaired. This defense system is known as the reticuloendothelial or R. E. system. In fact, every tissue in the body contains cells of this R. E. system. It is these cells that are the site of the vital injury resulting in death.

This system is vital when an animal is radiated at 400 roentgens. The loss of bone marrow and circulating cells, known as the granulocytes and neutrophils, seems to cause death when the animal is killed by radiation. There is additional new evidence that destruction of the R. E. system in the bone marrow, liver, and spleen is more important even than neutrophil loss.

These cells are scavengers, removing carbon particles and bacteria from the blood. If the animal kept in shock 2 hours is given 50 million bacteria in his vein, he will die. The dog develops septicemia and dies within 1 to 4 days. The defense against endotoxins is also weakened.

The poison extracted from the blood of the dog kept in shock 5 hours was lipopolysaccharide. If the blood containing this poison is given to a healthy dog, the dog lives. If, however, it is given to a dog that has been in shock 2 hours, the dog dies. The lipopolysaccharide extracted from the blood has all the properties of bacterial endotoxin.

There is a pool of endotoxin in the intestine and in the oral cavity. The minute the R. E. system fails, the endotoxins that are in the circulation all the time are not detoxified. The amount of poison that is fatal differs for species and individuals.

To show that the endotoxin goes from the intestine into the blood stream, bacteria have been grown in radioactive P-32. *E. coli* was used, since it is foreign to the rabbit. This was injected into the intestine of rabbits, half of which were healthy and half had been in shock. After 10 hours the rabbits were killed. The blood in the rabbits contained the specific endotoxin that had been injected into the intestine. There was more in the shocked rabbits than the healthy ones. It was present in the healthy animal's liver, partly broken down and partly intact.

The poison is always present and is capable of inducing shock. Non-septic shock becomes septic shock simply because of duration. Once the rate of blood flow has been stopped for several hours, the defense system against infection suffers and the patient is the victim of the ever present poison.

If an animal is in shock, it is important to treat the intestine promptly in an effort to eliminate the danger of irreversible shock due to endotoxin. The major bacterial pool is not in the wound, so an antibiotic administered orally, if possible, or intravenously can be helpful.

The phenomenon of irreversible shock should not be different, whether it is burn shock, tourniquet shock, dehydration shock, diabetic shock or peripheral vascular collapse. Once the failure of blood flow has persisted for a number of hours, this system is going to suffer and you have a victim of the perennial poison. If there is not enough endotoxin in the gut, there may be enough in the mouth, because absorption takes place throughout the gastrointestinal tract.

(Presented at the 27th annual American Animal Hospital Association meeting, Boston, Mass., April, 1960.)

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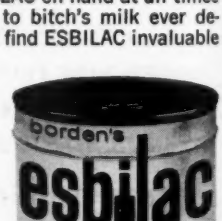

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Characteristics of a Rural Ohio Dog Population

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The number of dogs in a given area is of extreme importance to a veterinarian contemplating the establishment of a small animal hospital.[1] More detailed information on the age, breed and sex of the canine population is needed for the epidemiological investigation of problems, including dog bites, leptospirosis and neoplastic diseases.[2-5] Information on the immunization status and percent of dogs licensed is of importance in the control of communicable canine diseases such as rabies.[6]

Estimates of the canine population characteristics in an area are usually based on a sample of the licensed canine population. The accuracy of such estimates depends on the extent to which these truly represent the population at large. As an example, it might be expected that toy breeds would be confined more than some of the larger breeds, and thus a smaller percent of them licensed. Likewise, in most areas licensing is not required of animals less than 3 or 6 months of age. Under these conditions, an accurate estimate of age distribution could not be obtained from licensure data. When a larger license fee is charged for females than for males, fewer females may be licensed, thus giving a false impression of the sex ratio. The accuracy of information on other animal species is even more questionable, since even the basic data such as obtained through licensure are unavailable.

The investigation described below was undertaken to determine the exact characteristics of a selected canine population, utilizing a teen-age group to obtain the information, and to compare these characteristics with licensure data and other similar surveys.

The area selected for this study was Paulding County in northwestern Ohio with an area of 416 square miles. In 1960 it had a human population of 16,792, of which 98.2% was white. Only 17.5% of its population is urban, the largest village having 2,936 inhabitants.

In February and March, 1960, interviews were attempted by the members of the Paulding County 4-H clubs at 1,786 households representing approximately 33% of the 5,364 households in the county. Whenever possible, the information was collected from the head of the household. The census was taken in areas where there were cooperating clubs and not according to a prearranged statistical plan. A standard form was used to gather the data. This form was explained to the individual club leaders and they in turn relayed the procedure to the

members who were the actual census takers.

In addition to the usual identifying data, questions were asked about number of persons in the household, ages of dogs that had died during the past year and for each dog presently owned, information on breed, purebred status, sex, age, length of time owned or cared for, plus rabies and distemper vaccination status. Dogs were classified in a specific breed whenever readily recognizable. Otherwise, they were placed in the mixed breed group. When a dog was classified as being of a specific breed, the owner was asked, "Is this dog purebred?"

The county auditor's office was then visited and the dog licensure records of the entire county copied. The census and licensed populations were then matched and compared.

Results

Complete data were obtained on 91.1% of the total interviews with only 30 households refusing to cooperate. The questionnaires were very conscientiously completed and appeared reliable. Most omissions of data were due to owners' lack of information rather than to carelessness on the part of the interviewer.

A minimum of bias seems to have existed in the responses to the questionnaire used in the survey except for the natural rounding tendency on questions of age and length of ownership, and replies to the question, "Is this dog purebred?" (Approximately 30% of dogs were reported as purebred.)

Number: Of the households interviewed, 58.7% owned one or more dogs. Of those who owned dogs, 83.9% owned only one dog, with 3.8% owning 3 or more dogs. The mean size of the dog-owning households, 4.0 persons, was significantly larger ($P < .01$) than the mean size of the households not having dogs, 3.1 persons. These households harbored a total of 1,119 dogs, an average of one dog for each 1.6 households or each 5 people. Extrapolating this for the entire county, the owned canine population was estimated to be 3,600.

County auditor records indicated there were 1,861 licensed dogs at the time of the survey. A comparison of this number with the total estimated from the survey reveals that approximately 52% of the owned dogs in the county were licensed.

Breed: Disregarding purebred status, the most commonly reported breed was the collie, comprising 9.3% of the total. Next most common were the German shepherd (6.3%), beagle (5.1%) and fox terrier (5.1%). Fig. 1 illustrates the distribution by variety group.[7] Confusing abbreviations on the license records made it impossible in many instances to determine the breed. Therefore, the breed and variety group distribution of the licensed population was not determined.

The owners stated 76.3% of the toys were purebred, in contrast to only 22.0% of the terriers. The nonsporting group was reported as 57.1% purebred with approximately 43% of the remaining 3 groups reported as purebreds. No association was found between purebred status and age. The oldest mean ages were in the sporting (5.0 years) and nonsporting (5.1 years) groups, while the mean age of the hounds was only 3.2 years. Terriers, toys and working dogs ranged from 4.1 to 4.7 years.

Sex: The sex distribution as shown in Table 1 indicates a ratio of approximately 1.7 males for every female in the actual population and a 1.4:1 ratio in the licensed group. This difference is not statistically significant, with the exception of the spayed females. The apparently small number of spayed females in the licensed population could be a reflection of the incompleteness

TABLE 1
Sex of Licensed Dogs and Census Dogs, Paulding County, Ohio, 1960

Sex	Licensed Dogs		Survey Dogs	
	Number	Percent	Number	Percent
Male	1,066	57.3	665	59.4
Female	739	39.7	392	35.1
Castrated	—	—	1	0.1
Spayed	9	0.5	26	2.3
Unknown	47	2.5	35	3.1
Total	1,861	100.0	1,119	100.0

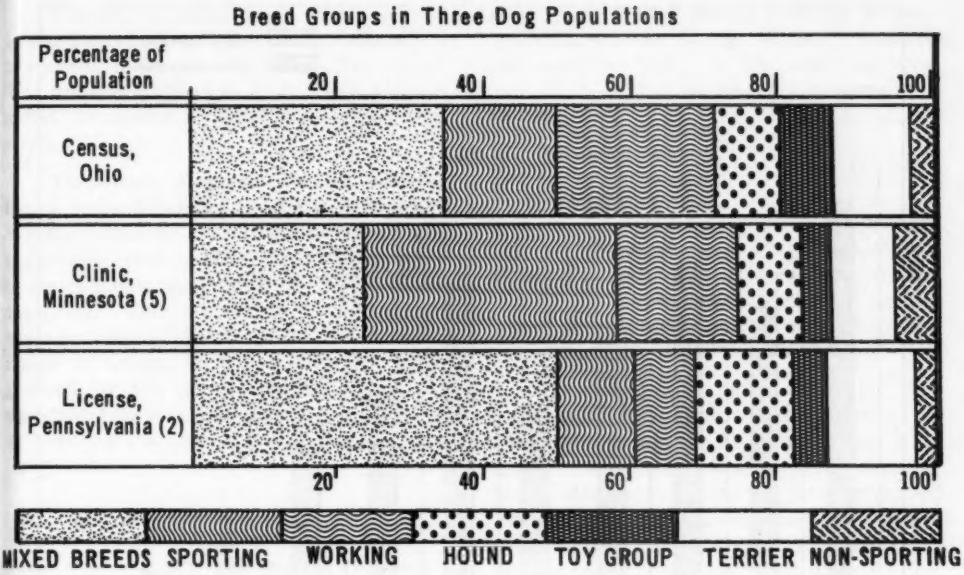

Fig. 1.

of licensing records. The mean age of the females was 4.7 compared to 4.1 for the males.

Age: The mean age of 4.4 years of the licensed dogs was almost identical with the 4.3 years of the census dogs.

The 3 oldest dogs found during the census were a 16-year-old male collie, a 17-year-old mixed female and a 21-year-old female Pomeranian. None were purebred and each had belonged to the present owner from the time it was a pup. A total of 73.1% of the dogs had been obtained more than one year prior to the survey, while 8.3% had been owned for 10 years or longer.

Most of the dogs had been obtained while young, 79.6% when less than one year of age, and an additional 11.8% when between one and two years of age. The informants listed 212 dogs as having died during the last year. Of these dogs which had died the previous year, 32.1% were under one year of age and 53.4% were less than 2 years old. On the other end of the scale, 12.3% of the dead dogs were over 10 years of age at the time of death, while the oldest dog among those that had died was 25 years of age. Only 6.9% of the live dogs were over 10 years old.

Table 2 shows that more dogs had been vaccinated against distemper than rabies, although immunization was not adequate for either disease. Those considered by their owners to be purebred had a significantly higher vaccination rate against both diseases ($P < .01$).

TABLE 2

Vaccination of Purebred and Non-Purebred Dogs for Rabies and Distemper, Paulding County, Ohio, 1960

		Rabies		Distemper	
	No. Dogs	Number	Percent	Number	Percent
Purebred	329	41	12.5	140	42.6
Not purebred	777	51	6.6	108	13.9
Unknown	13	4	33.3	4	33.3
TOTAL	1,119	96	8.6	252	22.5

Discussion

The cooperation of the informants and the completeness and clarity with which the

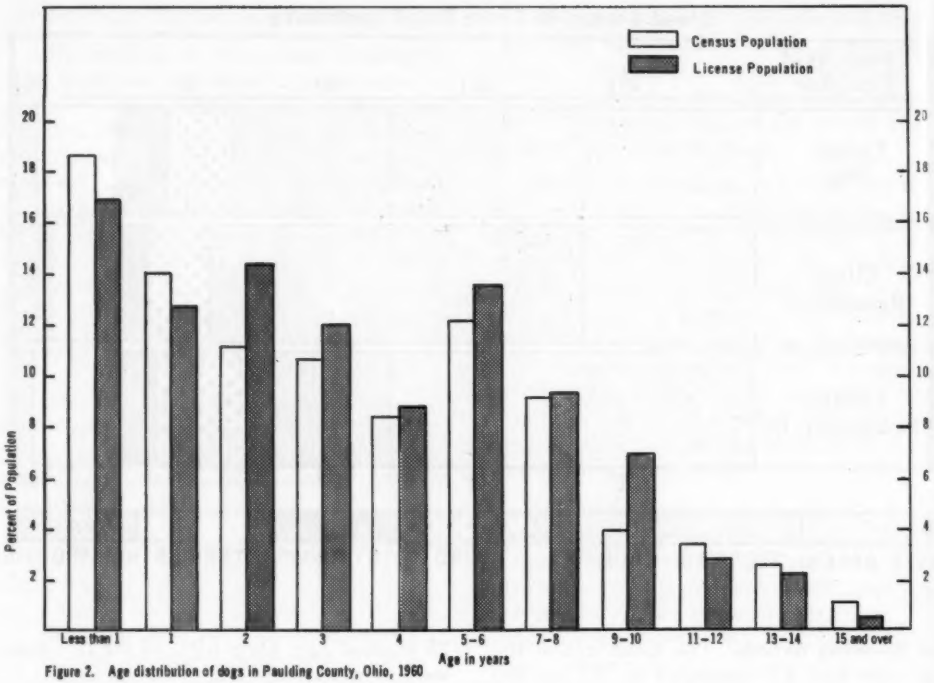

Figure 2. Age distribution of dogs in Paulding County, Ohio, 1960

forms were completed attest to the feasibility of utilizing a teen-age group when conducting animal censuses. With adequate training and supervision they can rapidly, accurately and economically accumulate the data necessary to quantify many community problems.

Comparison of the census and license populations demonstrates that a representative sample of the licensed population would have accurately characterized the age and sex of the canine population of Paulding County. Whether this would be true in other areas where different factors affect licensing remains to be demonstrated by further studies of this nature. Most of the licensed dogs were found in the middle-age groups, giving an unrealistic age distribution even though the mean ages of the two groups were similar (Fig. 2).

The ratio of 0.63 dogs per household found in our study is quite similar to the 0.52 reported from Atlanta, Ga.,[8] but differs markedly ($P < .01$) from the 1.54 per household from Fulton County, Ga.,[8] and the 0.24 from Denver, Colorado.[9] It should be noted that Cohen[4] in a New Jersey study, found the dog:person ratio higher in rural than in metropolitan areas.

The 30% level attributed to purebreds seems unrealistically high. If it is accurate, it does provide some interesting conjectures. The 2 groups with the highest proportion reported as purebred, toy and nonsporting, are those dogs which usually function primarily as companions.

The finding that purebred dogs are significantly better vaccinated than nonpurebreds could suggest they also receive better veterinary care. If this is so, the increased care is not reflected by a higher mean age in this study. The characteristics of the vaccinated and unvaccinated groups will be discussed in detail in later publications.

The only significant age difference was in the hound group ($P < .005$), which had a younger mean age than any other group. The number of dogs in each breed was too small to permit a valid age differential study.

The variety group distribution reported here is quite different from 2 other reports.[4,8] Whether this is a true difference in the populations or is a reflection of the sampling technics employed cannot be definitely determined. The drastic shift toward the younger ages (Table 3) encountered in the study of Orkin, *et al.*,[5] can easily be explained by the greater number of young dogs entering a clinic either for vaccination or with the diseases of puppyhood.

TABLE 3

Age Distribution of Five Selected Dog Populations

Population	Age in Years, Percent Total Population				
	Under 1	1-2	3-4	5-6	7 and over
Census, Ohio	18.7	25.1	19.0	12.1	25.1
License, Pennsylvania[2]	18.8	23.5	20.2	14.2	23.3
Survey, Denver[9]	19.4	21.8	18.7	15.8	24.2
Survey, Georgia[8]*	22.3	32.7	18.1	12.0	13.8
Clinic, Minnesota[5]	45.1	26.9	10.4	5.5	12.1

*1% unknown age.

Males are significantly more common than females in our census population (59.4% of 1,119) and licensed population (57.3% of 1,861). Cohen's[4] licensed group (58.2% of 61,366), and even more so Parrish's[2] licensed dogs (80.6% of 19,334) showed males to be more common. The equal distribution reported by Orkin[5] (49.4% of 1,000) could be explained by the large number of young females commonly presented to veterinary clinics for ovariohysterectomies.

It would appear, from the data on age of dogs when obtained and length of time owned, that most owners obtain their pets at a reasonably early age and keep them for the entire life of the animal. Cohen[4] found slightly fewer dogs dying at less than one year of age, 42.4%, but the 53.7% dying prior to their second birthday is nearly identical to our 53.4%. Similarly, Anderson[9] reported 33.8% at less than one year and 47.3% dying before they become two years of age.

Summary

A teen-age group in Paulding County, Ohio effectively served as canine census takers. A representative sample of the licensed population would have closely approximated the actual population.

The dog:person ratio was 1:5. The mean age of the dogs was 4.3 years. The oldest living dog was 21 years of age. The most common breed was the collie and the most common group was the working group. The dog population contained 1.7 males for every female. Most people obtained their pets at an early age and kept them for the entire life of the animal.

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Appraisal of the Value and Method of Use of Living Attenuated Canine Distemper Vaccines. This is primarily concerned with egg-adapted canine distemper (C.D.) vaccines but it must be recognized that virulent virus, given by serum-simultaneous and vaccine-virus methods, as well as inactivated viruses are still commonly used. Also, some still prefer Green's distemperoid. Certain of these products contain more than one strain of the virus, but there is no evidence of an immunological variation between strains, as no serological differences can be demonstrated. Variation in virulence is well known and on occasions a properly immunized dog will break down when exposed to a severe C.D. outbreak.

The best C.D. vaccines will induce a recognizable response in 96% to 98% of the dogs vaccinated. This 1 or 2 in every 100 which prove refractory to vaccination are not necessarily at risk. They likely possess a resistance independent of demonstrable antibodies. This view is sustained by the excellent results obtained from egg-adapted C.D. vaccines.

A single dose of potent vaccine can cause a satisfactory response in 96% to 98% of the 9-week-old puppies free from colostral immunity. Several workers have shown that only about 85% success can be expected in practice when 9-week-old puppies are vaccinated because a portion will still be carrying colostral immunity. This leaves 2 alternatives, delay vaccination or revaccinate all puppies a month or so later. In practice it appears that the overall picture of satisfactory results from 1 vaccination indicates that those puppies carrying colostral antibodies at 9 weeks probably develop satisfactory immunity from subclinical C.D. later in life.

There is substantial evidence to show that in a significant proportion of vaccinated dogs, the antibody level drops to an undesirably low level within 1 year. Thus, many revaccinate at 1 year of age. The practitioner must decide what is best in this respect, based on his knowledge of local incidence of C.D., history of the animal and risks involved such as going to dog shows, etc. Considerable research work has shown that revaccination in the presence of immunity is open to question. Only in a small percentage can a rise in antibody be detected.

Vaccination in the presence of disease is also open to question. It is difficult to understand how an attenuated virus can multiply and exert some specific effect in an animal already infected with a virulent virus. Foreign proteins have been known to influence the outcome of these cases. Studies in cattle have shown that a caprinized rinderpest virus did not influence the course of the disease.

The Vet. Rec., 73:944, 1961.

Thermal Stability of Egg-adapted Canine Distemper Virus. Freeze-dried egg-adapted canine distemper vaccine stored at constant temperatures of 98.6 F. and 90 F. began to lose potency within 2 days. When maintained at fluctuating temperatures reaching a maximum of 82 F. or higher, substantial loss of the virus occurred within a few weeks. When the maximum temperature did not exceed 72 F., potency was well maintained for 2 months or longer. At refrigerator temperatures and especially when maintained in the freezing compartment, there was no serious loss after 6 months.

The Vet. Rec., 77:898, 1961.

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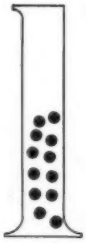

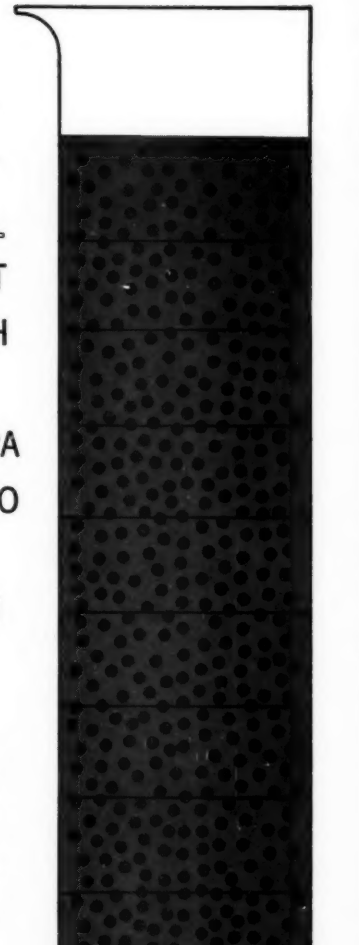

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Causes no clinical signs of disease, no histopathologic signs of disease, no hematologic signs of disease. Does not produce carriers or spread from vaccinated to susceptible animals. Does not revert to virulence even when deliberately "back-passaged".

The high-rabbit-passage vaccine combining the immunogenic properties of living virus and the safety of killed virus—

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modified live virus rabbit origin, vacuum dried

1. Newberne, J. W., *et al.*: Recent Studies on the Properties of a Nonvirulent Living Hog Cholera Vaccine, 62nd Annual Proceedings, U. S. Livestock Sanitary Association, 1958, pages 278-289.

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VETERINARIANS IN THE NEWS

A.V.M.A. Officials Address Land-Grant College Meeting

Addressing the Centennial Convocation of Land-Grant Colleges in Kansas City November 14, Dr. Jack O. Knowles, chairman of the AVMA Executive Board, discussed *"The Future of Small Animal Veterinary Medicine"* and Dr. Dan Anderson, President-elect of the AVMA discussed *"The Future of Large Animal Practice."*

Dr. Knowles asked veterinary educators to understand the problem, and condition their students from the very beginning, that they must advance "as least as fast as the trends." He urged that they make it a matter of prestige that "veterinarians would nearly have to come back for well-planned continuing education programs." The present vacuum in continued education was

(continued on page 38a)

Practice Management and Veterinary News Section

December 1961

DON'T WAIT UNTIL APRIL TO HELP YOUR TAX COUNSELOR 525

Economist Harold Ashe discusses value of keeping clear records and assembling tax data long before the filing deadline.

NEW DEVELOPMENTS IN CORPORATION PRACTICE TAX LAWS 527

A growing number of states are passing professional corporation acts. This article lists these states and points out the value of this legislation to you.

DECISIONS IN VETERINARY MEDICINE 528

An example of a court decision which ruled that "reasonable care and diligence in the exercise of skill" must be shown by veterinarians.

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Don't Wait Until April to Help Your Tax Counselor

Harold Ashe

Even the most skillful tax counselor cannot do full justice to your tax return if you fail to reveal all pertinent facts. In the preparation of a veterinarian's individual income tax return, tax counsel is obliged to make certain decisions and exercise certain choices in the interest of his client. Wrong decisions and choices may be made through no fault of counsel if counsel does not have all pertinent facts.

Completeness of the facts with which counsel works is the responsibility of the client. Therefore, it is wise for a veterinarian to keep accurate and complete records throughout the year, and to assemble related data long before tax filing deadline. The longer this is delayed the greater the likelihood that certain items will be overlooked.

A good many veterinarians probably do not have a complete schedule of all professional depreciable assets. They generally are aware that depreciation charges increase their costs, and thus decrease income subject to tax. Nevertheless, many depreciable items may not show up in depreciation schedules of tax returns. Some nonprofessional, but income-producing, depreciable assets may likewise be overlooked for tax purposes.

If a depreciable asset fails to appear in the income tax return for the year in which the asset is acquired, this oversight very likely will recur each succeeding year for the duration of its useful life. Thus, the veterinarian is penalized for the first year and every year thereafter. Example: Certain depreciable assets cost $500 after salvage allowance. The total tax saving is $130 during its useful life if a veterinarian is in the 26% income tax group. Failing to depreciate such items results in paying $130 more in income taxes over these items' useful life. Considering the moderate professional earnings for most veterinarians, this is a loss few can afford. It may represent the net professional earnings for several days.

Therefore, before seeking tax counsel, a veterinarian may wisely spend a little time making a physical inventory of all professional and nonprofessional depreciable assets. The latter should be limited to such assets as are held for the production of income. A physical inventory is suggested, because consulting only available records and past depreciation schedules may simply compound oversights.

Recovery: In this connection, it should be noted that depreciation is not lost on the remaining useful life of an asset, even though past depreciation has not been taken. Past depreciation, except as noted later in this article, is lost. Only remaining depreciation may be taken in current and subsequent returns. Thus, if an undepreciated asset has 10 years' normal useful life and 5 years' depreciation has not been taken, only 5 remaining years' depreciation may be taken. Such remaining depreciation will be at the rate of 10% a year for each of the 5 remaining years, based on initial cost.

If a substantial amount of available depreciation has not been taken in past years, it may pay to file amended returns for those years within the period covered by the statute of limitations. If tax recovery appears to be worthwhile, the filing of such an amended return or returns will more than justify the fee of a tax counselor for making amended returns.

A veterinarian can help his counselor materially by keeping account of all newly

acquired depreciable assets, their date of acquisition and cost. These may include new professional equipment or office furnishings and nonprofessional, income-producing assets as well. For example, if professional or rental property is acquired during the year, the counsel will need to know the cost of the property, less the value of the land, and date of acquisition for purposes of setting up depreciation. A property appraiser or real estate broker familiar with the area in which the property is located can make a close estimate of land value for purposes of determining the building value.

Gains and Losses: If any assets have been sold during the year, complete data on each transaction is needed to determine accurately the gain or loss. This must include a description of the asset sold, date of acquisition, cost, date of sale, the selling price, as well as any cost incurred in connection with the sale, such as commissions or advertising. If any costs in connection with the sale are overlooked, this will increase the net gain or decrease the loss, as the case may be. If it is a depreciable asset, depreciation must also be reflected. If improvements have been made subsequent to acquisition, this too must be taken into consideration. This item alone may turn an apparently profitable sale into a loss. This is because it increases the cost basis or, if not a loss, it will reduce the gain.

Casualty Losses: Expenditure of a little time in reviewing the year for casualty losses may be worthwhile, and such losses recorded. These losses such as fire, theft, earthquake, hurricane, flood, etc., are deductible to the extent not recovered from insurance. A memorandum should be made indicating the nature of the loss, its cause and the reasonable value of the loss at the time incurred, less insurance recovery, if any. Veterinarians who are allergic to record keeping should resolve to keep an itemized record of every conceivable professional expenditure, including out-of-pocket expenses which are often forgotten. Even more likely to be overlooked in tax accounting are some expenses in connection with income-producing properties or other income sources.

Determine Correct Choice: Often the standard deduction is taken when all of the facts would warrant filing a return itemizing personal deductions. The counsel should be supplied with an itemization of all personal deductions so he can make a decision based on the facts as to whether itemizing personal deductions will effect an income tax saving. Every category of personal deduction should be recorded, preferably at time it is established. These include medical expenses, contributions, taxes and interest. If there is any question as to the deductibility of an item, it should be noted anyway and be left to counsel's judgment. For example, contributions may be in kind as well as cash if made to organizations recognized by the Treasury Department. The state income tax should not be overlooked.

In calculating interest, such deductions are often overlooked on time-payment purchases. A ruling recognizes such charges, regardless of how styled. Interest paid on money borrowed on insurance policies is often forgotten. Medical expenses include medical services as well as medicines, crutches, canes, wheel chairs and similar accessories, hospital charges, nurses' salaries, including those employed in the home, and travel costs necessary to get medical care. Eyeglasses are deductible as are fees paid to Christian Science practitioners. The last few hard-to-reconstruct items or personal deductions may be in amounts sufficient to make the difference between using the standard deduction or, on the other hand, itemizing such deductions for a substantial tax reduction. Given an incomplete list of such deductions, tax counsel may err in favor of the government when a disclosure to him of all of the deductible items would reduce the tax assessment.

It is doubtful if any professional activity, hour for hour, will be as rewarding as the small amount of time necessary to reconstruct past and record future outlays of a tax-saving character. Only with all of the facts can a veterinarian be given by counsel every tax advantage to which he is entitled by law.

New Development in Corporate Practice Tax Laws

What may prove to be a great event in taxation which will benefit the veterinary profession is evolving through a series of state laws.

For years, self-employed doctors, dentists, lawyers, accountants and other professional men have been rankled at the discrimination in not allowing corporate-type tax benefits to be extended to them. Only as corporate employees could they qualify for a host of tax-saving advantages. Almost every state has prohibited incorporation by those engaged in professions.

Beginning in 1961, state legislatures all over the country have been passing professional corporation enabling acts. The acts take away the ancient legal roadblocks that usually prevent the professional man from practicing in corporate form. Under these acts, the doctor, for example, can form a corporation, become an "employee," and set up a pension or profit-sharing plan, with all its tax benefits.

In some states, the professional association (a legal creature which for tax purposes is treated as a corporation) is the chosen vehicle for professional men. The method varies, too. In some states, there are separate acts; in others, amendments to the general business corporation laws. Connecticut, Tennessee and Texas have placed professional association provisions into the Uniform Partnership Act.

Twenty-three states introduced legislation this year, and 15 states passed such legislation. Here is a final tabulation for 1961, showing states which passed professional corporation or association laws.

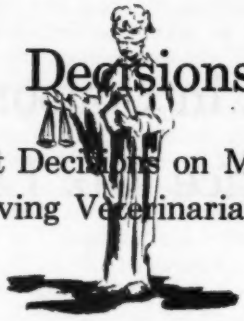
STATE	TYPE	COVERS	BILL NUMBER
Alabama	Prof. Assoc.	All Professions	H.B. 138
Arkansas	Prof. Corp.	Physicians and dentists	Acts 179 & 471
Connecticut	P.A. P.C.	All Physicians	P.A. 158 P.A. 394
Florida	P.C.	All	Ch. 61-64
Georgia	P.A.	All	Act 285
Illinois	P.A.	All	S. 804
Minnesota	P.C.	Physicians	Ch. 1, Ex. Sess.
Nebraska	P.C.	Physicians	Judicial decision
Ohio	P.C.	All	S.B. 550
Oklahoma	P.C.	All (except dentists)	S. 399
Pennsylvania	P.A.	All	Act 416
South Dakota	P.C.	Physicians	Ch. 29
Tennessee	P.A.	All	Ch. 181
Texas	P.A.	All	S. 119
Wisconsin	P.C.	All	Ch. 350

Note of Caution

The physician-patient relationship and the veterinarian-client relationship must survive the acts of incorporation. Veterinarians will still continue to be personally liable for malpractice suits.

The Florida Supreme Court has just ruled that it is not a violation of professional ethics for a lawyer to set up a professional corporation under Florida's new law.

Existing practice acts must be modified in many states before a veterinarian can take advantage of these new developments.



Decisions in Veterinary Medicine

Court Decisions on Malpractice Suits Involving Veterinarians

by Howard Newcomb Morse

"Veterinarian Must Use Reasonable Care and Diligence in the Exercise of his Skill . . ."

Dr. S., a veterinarian, treated a horse belonging to John F. for inflammation of the bowels. However, the horse did not have inflammation of the bowels, but instead had impaction of the colon. The last time the doctor visited the horse it was no better and he was informed of that fact. The horse was at that time throwing itself, getting up and throwing itself continuously. One could hear it out on the sidewalk and people complained of the noise. Mr. F. kept a man in attendance with the horse. The animal being in this condition, the doctor left, agreeing to call again the next day very early. He never came. The doctor's last call was on Monday and on Tuesday night Mr. F. called in another veterinarian under whose skillful treatment the horse recovered.

The doctor brought an action in the city court against Mr. F. to recover for professional services rendered and for medicines furnished. The court rendered judgment in favor of Mr. F. and the doctor appealed. The county court reversed the decision of the city court and Mr. F. appealed. The supreme court reversed the decision of the county court and reinstated the decision of the city court.

The supreme court stated: " . . . the same rules are applicable to the case of a veterinary surgeon bringing an action to recover for the value of his services as have been held applicable to other physicians and surgeons. He must possess and exercise a reasonable degree of learning and skill. He must use reasonable and ordinary care and diligence in the exercise of his skill, and the application of his knowledge. . . . I think, on the evidence in this case, the city court could properly find want of care and diligence on the part of the plaintiff (Dr. S.) in treating defendant's (Mr. F.'s) horse; in fact, great negligence . . . plaintiff, being called to treat the animal and having undertaken its cure on the day of his last visit when the horse was very ill, agreed to call the next morning early, but neglected to ever call again. I think the action of the plaintiff in leaving the animal he had assumed to take charge of in such a dangerous condition and failing again to call according to his promise was such clear negligence as justified the judgment rendered by the trial court . . . defendant's horse was suffering from an impaction of the colon instead of inflammation of the bowels, and therefore . . . the plaintiff, who prescribed for the latter disease, did not exercise a reasonable degree of skill in his treatment of the horse."

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for retained placenta FUREA®

Bolus Veterinary

Prevents or controls uterine infection associated with retained placenta • results in higher conception rates • fewer services per conception. Bottle of 25 boluses.

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VETERINARIANS IN THE NEWS

(continued from page 35a)

A.V.M.A. Officials Address

assailed by Dr. Knowles as "an indictment of our educational system and of organized veterinary medicine."

Dr. Anderson said that veterinary schools must place more emphasis on post-graduate specialty training, research, and broader liberal education. "Are we preparing our veterinary students for an agricultural society which is rapidly changing or are we still sending forth veterinary graduates who approach their 20th century clients with 19th century concepts of veterinary medicine?" he asked the veterinary educators.

He said the future livestock practitioner must be mainly a diagnostician and emphasized that the new progressive climate must begin in our schools.

ACP OFFICERS ELECTED FOR 1961-1962 AT THE 12th ANNUAL MEETING, ANIMAL CARE PANEL, SEPTEMBER 27, 28, 29, 1961 at the Statler Hilton Hotel, Boston, shown l. to r.: Dr. Robert J. Flynn, Argonne National Laboratory, Argonne, Illinois, Secretary-Treasurer; Dr. Melvin M. Rabstein, Fort Detrick, Maryland, President; Dr. L. R. Christensen, Berg Institute, N.Y.U. Bellevue Medical Center, New York, Vice-President.

Proclaim "Veterinary Medicine Week" in Kansas

Shown signing the document proclaiming the week of October 22-29 as "Veterinary Medicine Week in Kansas" is Gov. John Anderson Jr. From left are Charles Lingle and Tom Knappenberger, senior students at Kansas State University's School of Veterinary Medicine; Governor Anderson (seated at desk); and Dr. E. E. Leasure, dean of K-State's veterinary school.

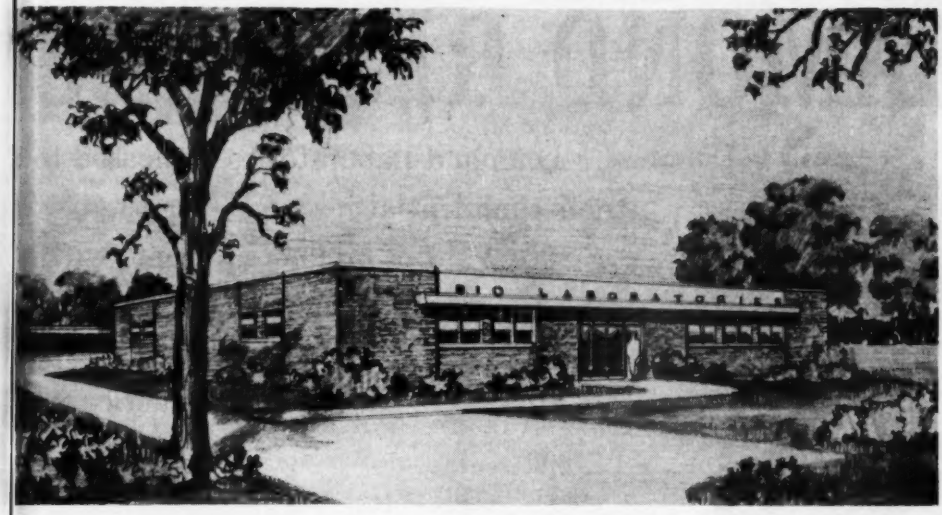
Veterinarians Promoted at Pharmaceutical Firms

Dr. Fred M. Murdock has been promoted to Vice President of Research for Philips-Roxane, Inc. Philips-Roxane, a subsidiary of Philips Electronics and Pharmaceuticals Industries Corp., is active in the human, plant, and animal health fields. Dr. Murdock will also direct production of human biologicals.

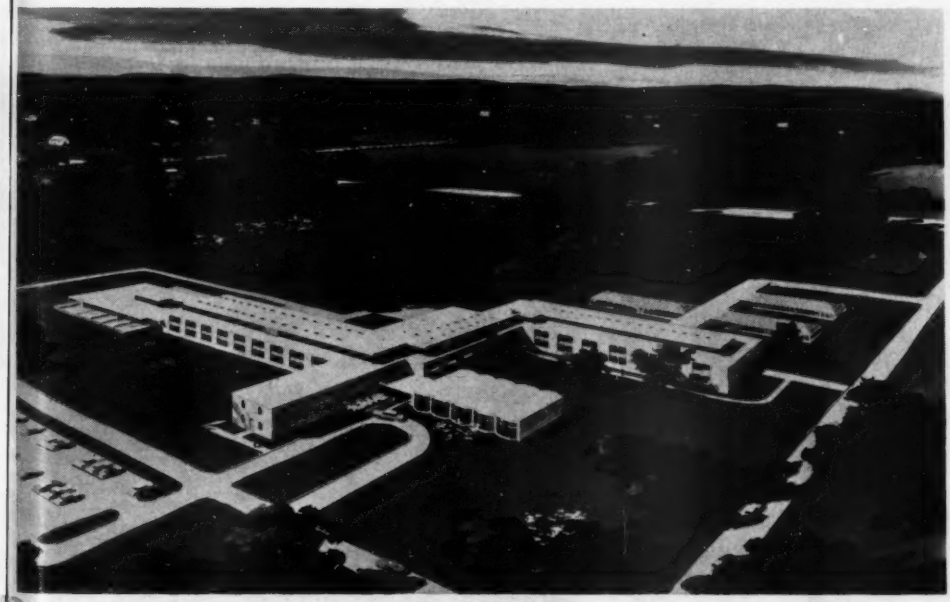
Jensen-Salsbery Laboratories, Inc., Kansas City, Missouri, has appointed a new research director, Dr. Iain Paton, M.R.C.V.S.

Dr. Paton is a graduate of Glasgow University, Scotland, and came to Jensen-Salsbery from Glasgow in 1958. Since that time he has served as director of professional services for the veterinary supply company. Dr. Paton is 34. He and his wife, Dorothy, have two children and live in Shawnee, Kansas, a suburb of Kansas City.

Pharmaceutical Firms Move into New Facilities



The expansion of facilities to serve the veterinary and agricultural fields has been widespread in recent years. Two more firms have just moved into attractive new structures. Pictured above is the new home of Bio Laboratories, now located just outside Kansas City, Kansas. The building houses their laboratory and administrative operations. Below is an architect's drawing of the new plant for American Cyanamid's agricultural division located in southern New Jersey. The new plant covers 640 acres and houses 550 employees.



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their confidential research files to give y
preview of products to come within
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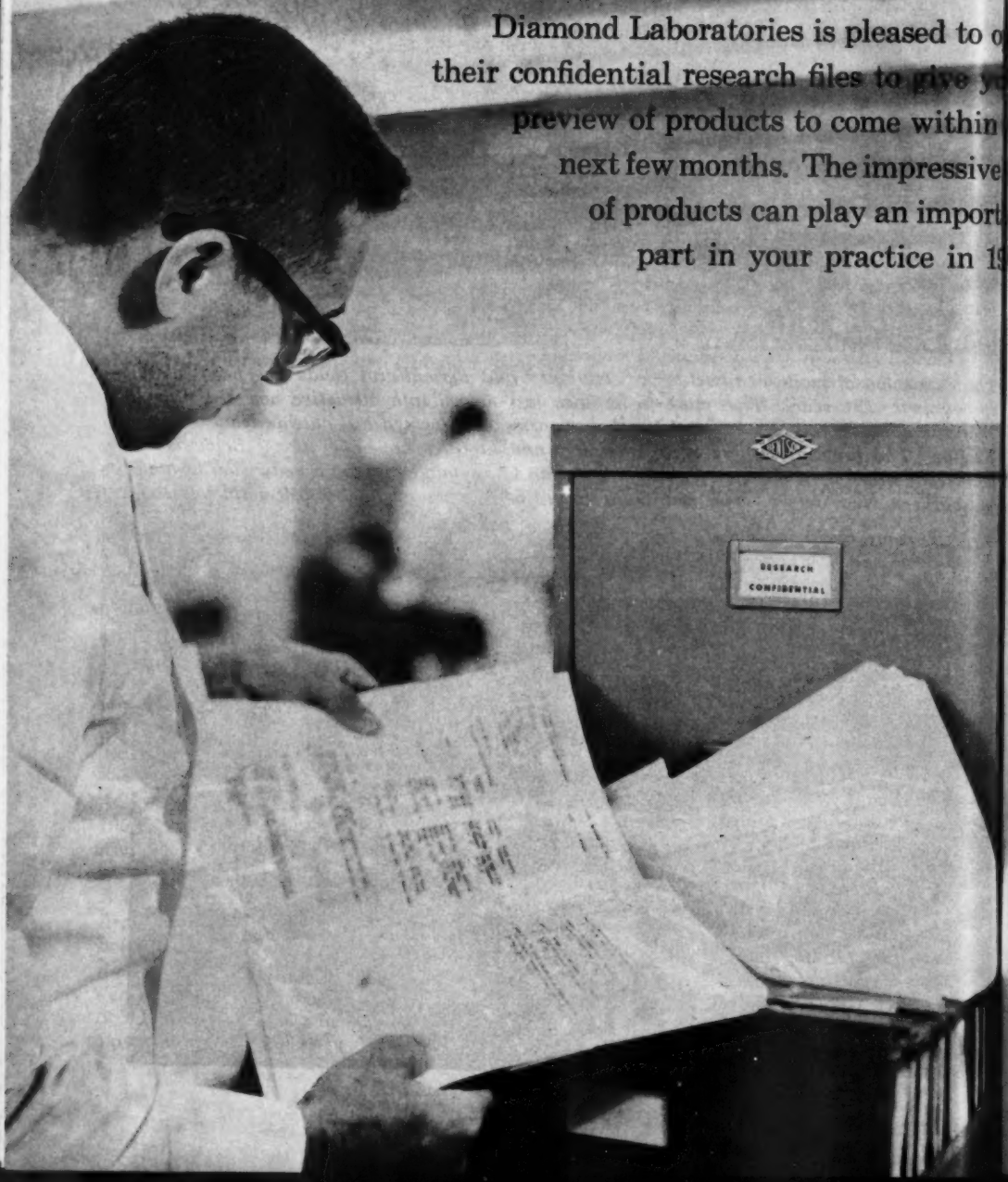
of products can play an import
part in your practice in 19



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1. TAYLOR TEST KIT

A simple, inexpensive kit for the diagnosis of hog cholera. Heralded by experts as an outstanding research discovery.

2. CERTIGEN

A new multicell tissue culture hog cholera vaccine offering the highest potency of any hog cholera vaccine ever marketed.

3. ANATEST KIT

A kit for the simple diagnosis of anaplasmosis — significant advancement in controlling anaplasmosis in cattle.

4. T. C. D.

A new canine distemper vaccine of ferret tissue culture origin, bearing Diamond's CERTIGARD Standard potency.

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A new tissue culture vaccine, now combining in one effective 2cc dose protection against canine distemper, infectious hepatitis, Leptospira canicola and icterohemorrhagiae in dogs.

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Research accomplishments are not an accident at Diamond. They are the results of long range programs, based on the needs of the profession. For instance, Diamond's research teams have programed and developed continual improvements in killed antigen products. First NEOJEL® was discovered as an adjuvant that offers longer immunity, smaller dosage and superior toleration. Then Diamond's CERTIGARD Standard program was inaugurated to assure the practicing veterinarian of continual high quality. Now with the development of INACTISOL, which provides up to 50% greater antigenic potency, it becomes apparent that better quality products are becoming available to the profession through Diamond research. Whenever you use Diamond products you can be assured of high quality . . . through research.

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Preliminary Studies on a Safe and Efficient Diuretic in Sheep

Charles E. Cornelius, D.V.M., Ph.D.
School of Veterinary Medicine
University of California
Davis, California

The need for studies on diuretics in ruminants and the anion-cation excretion in the urine following their administration is well recognized. In a previous study on alfalfa-fed sheep using the carbonic-anhydrase inhibitor acetazolamide, oral doses of 80 mg. and 1,000 mg. transiently increased urinary phosphorus excretion on the average of 20 and 100 times respectively 3 to 12 hours after its administration.[1] Another group of recently synthesized diuretic compounds combine thiadiazine and benzene rings with sulfamyl and chlorine substitution.[2] It was observed that these benzothiadiazines introduced a new property, the ability to block sodium chloride reabsorption by the renal tubule. Very little carbonic-anhydrase inhibitory activity remained and a mercury-like action of natriuresis and chloruresis occurred. The ability of this group of compounds to interfere with different enzymatic reactions supplying energy to a common mechanism for sodium transport is well known.

Just recently a new compound, 4-chloro-benzene-1, 3-disulfonamide, was studied by Duster.[3] He found a 1.97-fold and a 4.45-fold diuresis in rats receiving the diuretic *per os* at the rates of 2.5 mg./kg. and 10 mg./kg. body weight respectively. Diuresis at 2.5 mg./kg. was accompanied mainly by an increase in the elimination of sodium chloride, with potassium excretion remaining unchanged. At higher levels of oral administration, the excretion of potassium was only slightly elevated in rats. Creatinine and PAH clearance were not greatly affected, even with larger oral doses. Duster also reported excellent results in severely edematous humans receiving 0.75-1.25 gm. *per os* daily. Excretory volumes resulting from therapy were as large as those obtained from injection of mercurial preparations and nearly twice as large as those obtained by carbonic-anhydrase inhibitors.

Kabisch[4] observed that tolerance of doses to a similar diuretic (6-chloro-benzene-1, 3-disulfonamide) when given orally to dogs up to 100 mg./kg. of body weight was excellent. Diuresis appeared in man about 2 hours after oral administration of the drug and reached a peak rate of excretion at 5 to 7 hours. It differed markedly from acetazolamide by acting in an acid medium with less elimination of bicarbonate in the urine.

Clinical Study

Urine volumes were measured at 1-day intervals for 4 days prior to drug administration and at 8-hour intervals for 72 hours following administration. Urine was routinely collected under toluene in an ice

This study was supported in part by a grant-in-aid from Jensen-Salsbery Laboratories, Inc., Kansas City, Mo.
The author is indebted to L. Burnham and J. Bishop for technical assistance.

bath from sheep in metabolism stalls as previously reported.[1] Serum and urine sodium, potassium, calcium and magnesium ions were measured by a Beckman model DU Monochromator and flame attachment with a special amplifier and power supply (constructed by R. J. Jackson, Davis, Calif.) for photomultiplier tube 1-P28. Bicarbonate ion was determined by the Van Slyke apparatus[5] and chloride measured as described by Sendroy.[6] Phosphorus was determined as recommended by Fiske and SubbaRow.[7] Sheep received a diet of alfalfa pellets *ad libitum* and an excess of fresh water was available to the sheep on trial at all times. The level of drug administration to sheep is presented in Table 1.

The diuretic response and urine ion excretion following the administration of 4-chloro-benzene-1, 3-disulfonamide is presented in Fig. 1-5, with additional supplemental data on certain sheep in Table 2. All cations and anions measured except phosphorus increased appreciably in the first 8 hours after diuretic administration. Sheep were bled prior to and during the time of greatest diuresis and no significant change occurred in the serum sodium or potassium levels in sheep 1405, 1406, 1407 or 1408. It was of special interest that urine phosphorus levels did not increase following drug administration, since any elevation in urinary phosphorus concentration may be predisposing to urolithiasis in sheep. Complete blood studies revealed no hematological changes occurred in sheep receiving the diuretic.

Although the exact mode of action of this diuretic in sheep is not known, it would appear from the urine ion excretion that diuresis may result from an inhibition of renal tubular reabsorption for Na and possibly other ions, as has been found in the case of chlorothiazide. Diuresis from 4-chlorobenzene-1, 3-disulfonamide more closely resembles the action of a diuretic salt than of a carbonic-anhydrase inhibitor. Further studies on the clinical use of this promising ruminant diuretic are warranted.

TABLE 1

Weight of and Diuretic Dose Administered to Experimental Sheep

Sheep* No.	Weight Kg.	Dose mg./kg. body wt.	Route of Administration
1405	35.0	2.5	Intravenous
1407	50.9	5.0	"
1409	45.0	5.0	"
1411	34.5	20.0	"
1410	50.9	2.5	Oral
1406	36.3	14.0	"
1408	39.5	25.0	"
1413	41.8	20.0	Intramuscular

*All sheep were castrated males, approximately 1 year of age.

TABLE 2

Supplemental Electrolyte Excretion Data from the Urine of Experimental Sheep Nos. 1405, 1406, 1409, 1410 and 1411 Receiving 4-chloro-benzene-1, 3-disulfonamide

Animal No.	Constituent in Urine	Days Before			Days After Administration of the Diuretic					
		-3	-2	-1	1	2	3	4	5	6
	mEq/day									
1405	HCO_3	307	389	279	351	302	209	505	380	481
	Cl	129	161	158	196	175	183	148	178	75
1409	HCO_3	361	365	260	603	412	413	318	438	530
	Cl	232	157	189	232	183	287	307	218	383
1411	HCO_3	375	546	703	573	—	385	373	233	234
	Cl	236	243	372	369	—	220	189	184	131
1406	HCO_3	376	393	300	334	302	443	349	—	309
	Cl	194	188	154	266	149	203	115	—	70
1410	HCO_3	—	872	308	917	584	553	780	640	—
	Cl	121	141	123	109	154	196	355	203	—
	Na	112	200	112	111	—	—	—	—	—
	K	228	508	119	389	—	—	—	—	—
	Mg	49	32	45	32	—	—	—	—	—
	Ca	2.0	1.2	2.1	2.0	—	—	—	—	—
	Urine vol. in liters	1.55	1.46	1.54	2.56	2.25	2.07	2.45	2.38	—

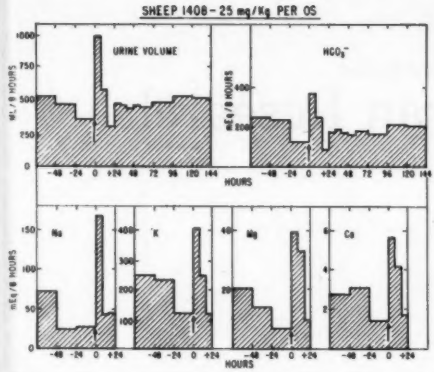


Fig. 1. Urine and ion excretion following the oral administration of 25 mg./kg. of 4-chloro-benzene-1, 3 disulfonamide.

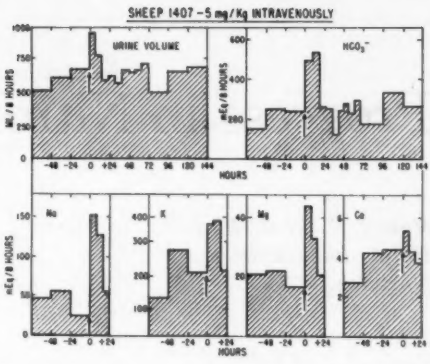


Fig. 2. Urine volume and ion excretion following the intravenous administration of 5 mg./kg. of 4-chloro-benzene-1, 3 disulfonamide.

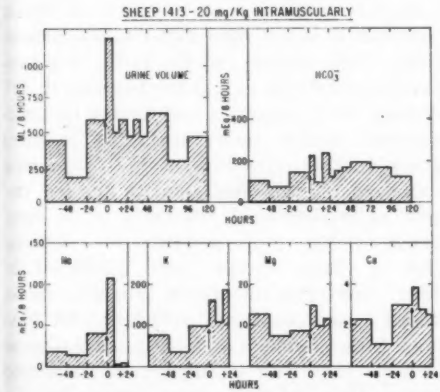


Fig. 3. Urine volume and ion excretion following the intramuscular administration of 20 mg./kg. of 4-chloro-benzene-1, 3 disulfonamide.

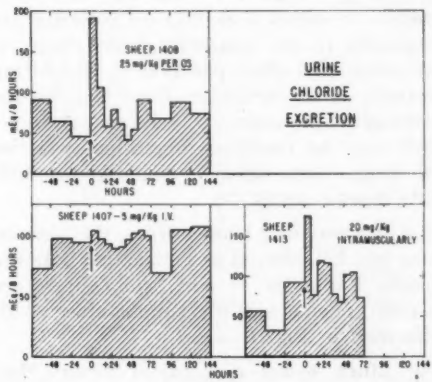
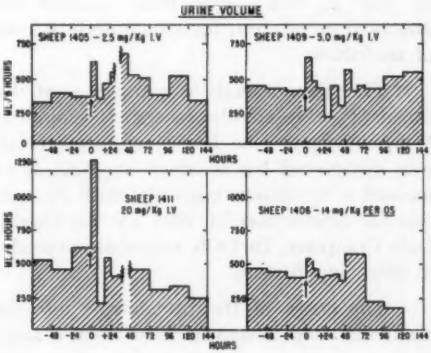


Fig. 4. Urine chloride excretion following various dosages and routes of administration of 4-chloro-benzene-1, 3 disulfonamide.

Fig. 5. (right) Diuretic response following the administration of 2.5, 5.0 and 20 mg./kg. I.V. and 14 mg./kg. *per os* of 4-chloro-benzene-1, 3-disulfonamide. ⟶



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Progress in Nitrofuran Research

Henry E. Paul, Ph.D.
Eaton Laboratories
Norwich, N. Y.

The nitrofurans are a group of man-made medicinal chemicals effective against many disease-producing organisms. Their introduction has opened a new chapter in medicinal chemistry. Although not antibiotics or sulfas, they become powerful antagonists to an unusually wide range of microbes and other parasites by inhibiting certain vital metabolic functions of the pathogenic organisms. The nitrofuran molecule may be modified to produce a series of drugs, each uniquely suitable for definite disease areas.

In many well-known drugs, the benzene ring has long served as a chemical building block. Examples of such compounds are aspirin, phenol and the sulfonamides as illustrated in Fig. 1.

Much newer to medical history, but of rapidly increasing importance, is a structure known as the furan ring. This is fundamental to the class of drugs called the nitrofurans. The structural properties of the "big four" nitrofurans are illustrated in Fig. 2, along with their generic and chemical names and their outstanding areas of usefulness.

The commercial investigation of the furans is a relatively recent development. While furfural (the key starting material) was discovered by accident in 1832, it remained a laboratory curiosity until its commercial production in 1921 by the Quaker Oats Company. In 1930, chemists succeeded in nitrating furfural.

The entry of the nitrofurans into the medicinal field began in 1940 when a small research group of Eaton Laboratories, Division of The Norwich Pharmacal Company, at Norwich, N. Y., investigated the antibacterial properties of a group of furan compounds which they had made synthetically. "Why should not the furan ring produce useful drugs as had the benzene ring?" A program of synthesis and testing for antibacterial action established that a nitro group in the 5 position of the furan ring conferred on the compound a marked degree of antibacterial effectiveness as compared to that of its non-nitrated relatives. Out of these studies, first published in 1944,[1] arose the nitrofuran, Furacin, introduced as a topical antibacterial agent having a broad range of activity against diverse bacteria occurring in infected wounds and burns. Even at concentrations as low as one part in a million, Furacin can interfere in the early growth phase (lag phase) of bacteria, hence markedly slowing bacterial multiplication.

The acceptance of the nitrofurans in medicine since 1944 can be expressed in terms of the numbers and scope of subsequent scientific publications. Since that date, over 4,000 scientific articles concerning the nitrofurans have been written in 26 languages in 40 different countries. Perhaps the primary factor contributing to the acceptance of the nitrofurans in medicine has been their unusual effectiveness as chemotherapeutic agents against microbial enemies, ranging from Gram-positive and Gram-negative bacteria through protozoa and fungi, as illustrated in Fig. 2. Most often a nitrofuran concentration of only

FIG. 2

FOUR OUTSTANDING NITROFURANS

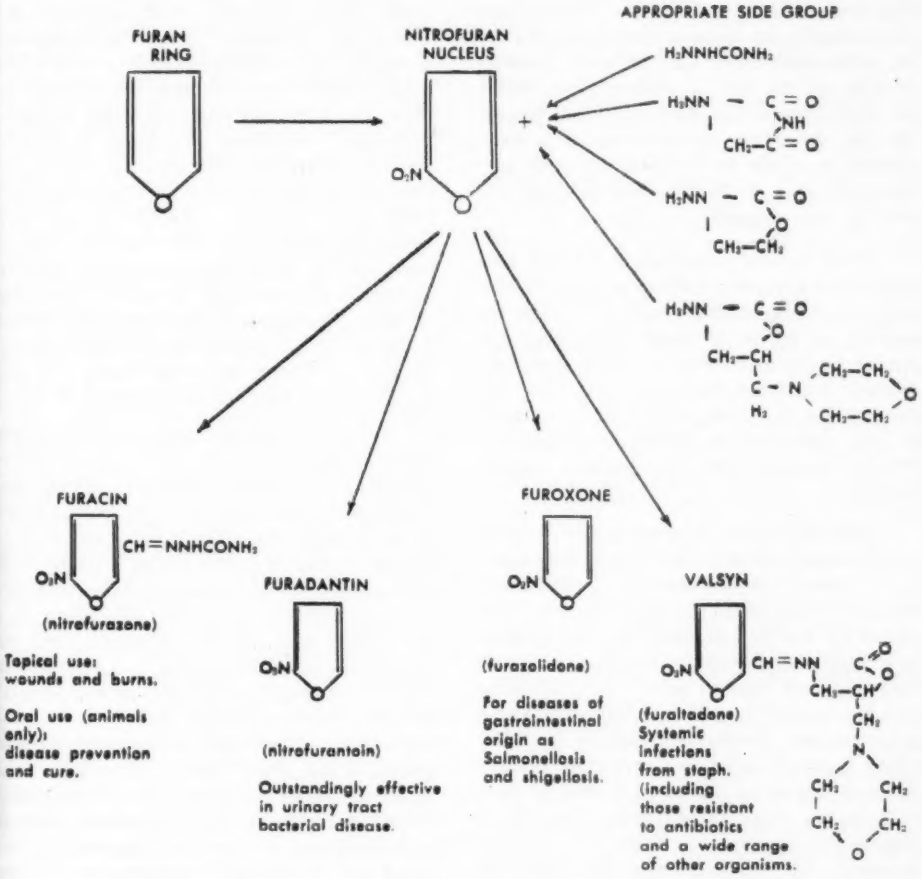
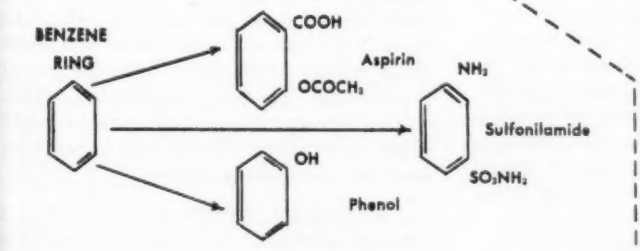


Fig. 1 Drugs from the benzene ring



a few parts per million has marked antimicrobial activity. Other important characteristics responsible for nitrofuran acceptance are: (1) Antibacterial effectiveness with little or no *in vivo* development of resistance by disease organisms following continued use. (2) Minimal toxicity or side effects from prolonged use. Nitrofurans do not accumulate in animal tissues. (3) In agriculture the nitrofurans promote growth, increase feed utilization and productivity, as well as cure and prevent disease in farm animals.

How do the nitrofurans act on bacteria? They have a rather specific inhibitory activity on certain enzyme systems, the activity on many of these being most apparent under anaerobic conditions and decreased under aerobic conditions. The formation of acetyl coenzyme A from pyruvate is very sensitive to nitrofuran inhibition. The nitrofurans are not general enzyme poisons.

Each nitrofuran has highlights of medical interest. Following the historically great D-Day assault on the beaches of Normandy during World War II, Furacin rose from obscurity by its outstanding effectiveness as a topical dressing in the care of badly wounded and burned survivors. Following this, the use of Furacin as a topical dressing spread rapidly. Some years ago in the Midwest, research workers studying poultry diseases requested a small amount of Furacin as the pure nitrofurazone crystals to experiment in the treatment of poultry diseases.[3] Furacin was soon established as remarkably effective against coccidosis, a disease of considerable economic consequence to poultry raisers. The effectiveness of Furacin against this protozoan parasite, as compared to drugs available at that time, soon led to the annual use of many tons of this chemical in poultry feeds as a preventive measure against this prevalent disease. Furacin is used widely in mastitis control. It is also applied in farm animals and pets as a topical antibacterial agent, in forms similar to those employed in human medication.

While the nitro group of the nitrofuran molecule as well as certain characteristics of the so-called "side chain" are essential to marked antibacterial activity, it was discovered later that appropriate changes of this chain attached to the ring could alter markedly both physical and biological properties, such as solubility, physiological distribution and excretion patterns. Hence, even though the nitrofurans may have certain properties in common, molecular variations as shown in Fig. 2 impart individual characteristics to each compound, making each a drug entity with properties uniquely suitable for definite areas of medical use. As examples, laboratory studies show that Furadantin appears at high concentrations in urine; Furoxone persists throughout the intestinal tract, while solubility characteristics and a broad antibacterial spectrum make Furacin a logical candidate for topical formulation.

Now let us turn from the oldest nitrofuran, Furacin, to one of the newer nitrofurans, furaltadone (Valsyn). There has been much publicity on the deadly infections caused by *Staphylococcus aureus*, known as the "Golden Killer." Its remarkable ability to develop resistance to many potent antibacterial drugs has made it a formidable bacterial foe. Hospitals are policing all operations to keep this resistant "staph" in check, while the growing health hazard of the organism has been pointed out clearly from time to time in various publications. At Eaton Laboratories the research scientists joined the many other forces struggling with this critical problem and instigated a screening program to test hundreds of available compounds for one that would be effective against "staph," coupled with as wide a range of antibacterial action as possible. Out of the thousands of bacterial cup-plate tests and the multitude of mice treated, came the nitrofuran Furaltadone, an effective "antistaph" drug.[4] While Furaltadone is not yet generally available to the veterinarian, clinical studies demonstrate its usefulness in poultry water medication, mastitis and several other areas of veterinary medicine.

Furadantin, introduced in 1953 for infections of the urinary tract in man, has grown in use to a universally accepted drug for bacterial urinary tract disease in both

man and animals. Since the report of the first laboratory studies,[4] there have been over 850 publications on Furadantin alone, a tribute to its usefulness.

A 4th nitrofuran, Furoxone, in contrast to Valsyn, made its medical debut in the veterinary field as a successful combatant against poultry diseases of gastrointestinal origin, such as fowl typhoid and pullorum disease, etc. Later, when introduced into human medicine, its activity was soon found to be most striking against those diseases caused by *Salmonella* and *Shigella* species.[5] The potential usefulness of this drug in international medicine can best be realized from statements that gastrointestinal diseases account for as much as 70% of all human illness. Of course, it must be realized that the densely populated tropical countries add heavily to such statistics. Furoxone's effectiveness should be more fully realized when it can be brought to those geographical areas with prevalence of bacterial dysentery caused by the *Shigella* sp. and *Salmonella* organisms. Furoxone's usefulness is still expanding in the veterinary field, particularly where control of subclinical bacterial or protozoal infections will improve the overall economy of animal and poultry production.

A series of over 800 nitrofurans have now been made. From these, the unique properties of a select few are now being studied in the research laboratory and in clinics throughout the country to counteract those diseases not yet properly controlled or conquered.

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Characteristics and Uses of the Nitrofurans in Veterinary Medicine. John E. Martin, *M. S. U. Vet.*, 19:95 (winter), 1959.

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The Nitrofurans in Clinical Medicine. P. F. MacLeod, G. S. Rogers and B. R. Anzlowar, *Internat. Rec. of Med.*, 169:561 (Sept.), 1956.

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Nitrofurans. H. J. Sanders, R. T. Edmunds and W. B. Stillman, *Indust. and Engin. Chem.*, 47:358 (March), 1955.

Presented in part at the Fourth Regional Conference on the Nitrofurans in Veterinary Medicine, April 1, 1960, Fairmont Hotel, San Francisco, Calif. Held under the auspices of the Bay Counties Veterinary Medical Association and Eaton Laboratories.

Animal Health Institute Education Program Helpful

Veterinarians are experiencing beneficial results from the American Foundation for Animal Health's educational campaign to farmers on behalf of the profession. This was verified by a survey conducted by Central Surveys, an independent research organization. The survey was mailed to a 10% cross section of the general practitioners in each area of the United States. A better than 50% response indicated a high interest in the subject.

Seventy-three per cent of the veterinarians responding said they felt a definite benefit from the campaign, 30% indicated that it helped a great deal and 43% believed it helped some. Another question asked was, "How much good is the campaign doing to help you meet drug and feed store veterinary competition? Fifty-four per cent of the answers indicated a definite good from the program in the field, 12% reported a lot of good and 42% some good.

MEDICAL INTERCHANGE

Notes and abstracts screened from the medical literature for their special interest to veterinarians by Lynn Stratton Morris.

Studies on Cause of Death in Obstructed Intestine

The intestinal bacteriology of experimental closed loop, strangulated obstruction in 24 dogs was contrasted with that of 25 normal dogs.

In recent work, clostridial toxin was shown to be the major lethal factor in the peritoneal fluid of rabbits with nonperforated strangulated obstruction. However, peritoneal fluid resulting from perforated, closed loop, strangulated obstruction in the dog was not lethal. For this reason the present study was undertaken.

Qualitatively it was found that the predominant intestinal flora of normal dogs consisted of Escherichia, Clostridium, streptococci, staphylococci and Aerobacter. In strangulated obstruction the predominant flora of loop fluid, peritoneal fluid and blood cultures consisted of Escherichia, Clostridium, streptococci and Bacteroides.

Quantitatively, in both control and experimental dogs the most common bacterial groups were also the most numerous. The highest minimal, maximal and median counts were in loop fluid. Median counts for peritoneal fluids from animals with perforated loops were greater than from animals with nonperforated loops. Clostridium and Bacteroides exhibited the most dramatic increase in strangulated obstruction. The concentration of Clostridium in peritoneal fluid was independent of perforation of the closed loop.

A striking change in intestinal flora was associated with a lethal peritoneal fluid. On the other hand, the peritoneal fluid resulting from strangulated obstruction in dogs was shown to be lethal when injected intraperitoneally into anesthetized dogs, but not lethal when the dogs were not anesthetized.

These studies focus attention to either individual or combined roles for bacteria or bacterial products in death. However, the lethal agent in strangulated obstruction continues unknown.

Gastroenterology, 41:245-250 (September) 1961

Toxoplasma gondii Isolated from Eggs

Human toxoplasmosis may be contracted through the eating of raw or undercooked infected eggs, investigators from India's Veterinary Research Institute have warned.

Dr. P. G. Pande and associates have isolated *Toxoplasma gondii* from the chorioallantoic membranes of chicken eggs, according to a report in *Science*. Identity of the organism was confirmed by its transmission to mice and by serological tests.

One previous study revealed Toxoplasma cysts in the ovaries of an infected hen, but Dr. Pande's work is the first instance in which eggs have been incriminated. The possibility that toxoplasmosis may be transmitted from hens to eggs to man needs urgent and immediate attention, he concludes.

Med. World News, 2:6 (Oct. 13) 1961

Dizan® Suspension

with piperazine citrate*

Formulated for the equine species, this new vermifuge compound reaches higher levels of efficacy than achieved by previously used wormers, yet is safe even for ponies and foals.

The anthelmintic spectrum is exceptionally broad, controlling large roundworms *(Parascaris)*, stomach worms *(Habronema)*, pinworms *(Oxyuris)*, and various strongyles *(Strongylus)*.

This is a professionally acceptable vermifuge, designed to be administered *via* stomach tube. Extended trial by equine practitioners has proved its worth. Write for literature or see your CS supplier.

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HOOKWORMS IN DOGS

LABORATORY TRIALS

DOGS INFECTED WITH ANCYLOSTOMA BRAZILIENSE

Dose D.N.P. milligrams per pound body weight	Eggs per gram feces Pretreatment	Post	Worms at Necropsy	Per cent Reduction
3.4	2100	0	0	100
3.4	3100	0	0	100
3.4	8200	0	0	100
3.4	2100	0	0	100
3.4	2300	0	4 dead	100
3.4	1800	0	8 dead	100
0	2900	—	41	0

DOGS INFECTED WITH UNCINARIA STENOCAPHALA

Dose D.N.P. milligrams per pound body weight	Eggs per gram feces Pretreatment	Post	Worms at Necropsy	Per cent Reduction
3.4	7	0	0	100
4.5	11	0	0	100
0	8	12	35	0

DOGS INFECTED WITH ANCYLOSTOMA CANINUM

Number dogs	Mg. D.N.P. per pound	Range Eggs per gram feces Pretreatment	Post	Worms at Necropsy	Per cent Reduction
2	1.1	44-46	10-13	21-41	9-55
10	2.3	29-29	0-1	0-12	84-100
9	3.4	29-73	0-2	0-1	97-100
2	4.5	33-35	0	0	100

D.N.P. Disophenol Parenteral 3.5% is available singly in 10-c.c. vials, or in 12-vial packages.

D.N.P.® Disophenol Parenteral 3.5% is a sterile solution containing 35 mg., Disophenol per c.c.

It is highly effective for the treatment of dogs infested with hookworms, including *Ancylostoma caninum, A. braziliense* and *Uncinara stenocephala.*

Treatment

Special pretreatment or posttreatment handling of patients is not required. D.N.P. has been shown to be safe at recommended dosage by clinical trials in dogs of all ages, including day-old puppies.

A single subcutaneous injection of D.N.P. usually results in a 100 per cent kill of adult hookworms. Dosage is 0.1 c.c. per pound of body weight. D.N.P. is primarily effective against adult hookworms.

Precautions

Do not repeat treatment within 14 days. A fecal examination should be made two to four weeks following initial treatment. Periodic fecal examinations should be made because of the possibility of re-infestation.

It is also desirable to use supportive therapy in puppies with severe anemia resulting from heavy hookworm infestation.

Field trials

Veterinarians have reported on the treatment of 671 dogs with D.N.P. These dogs weighed one-half to 112 pounds, ranged in age from 2 days to 13 years and included pregnant bitches. No reactions from D.N.P. were reported. Veterinarians reported that 88.2% of 671 dogs, treated with one subcutaneous dose of D.N.P., were free of hookworm eggs and 10% showed significant reduction of hookworm eggs on posttreatment fecal examination.

Laboratory trials

The results of four laboratory trials with D.N.P. are shown at the left. Veterinary Professional Service Department, American Cyanamid Company, Princeton, New Jersey.

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D.N.P. DISOPHENOL PARENTERAL 3.5%

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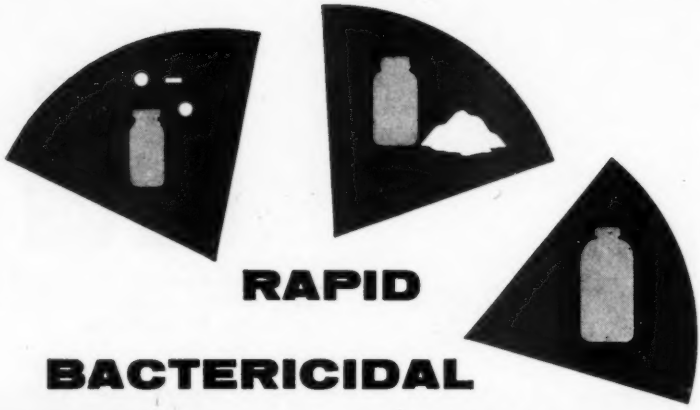

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■ systemic bacterial infections—horses, cattle, sheep, dogs and cats ■ mastitis ■ wounds; eye and ear infections—topical application ■ metritis and pyometra—intrauterine use ■ bacterial intestinal infections in swine, calves, dogs and cats—both prevention and treatment

Worried about resistant organisms? Daribiotic is *bactericidal*—resistant organisms rarely develop.

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NEW Daribiotic Liquid—4-oz. bottles
Daribiotic Tablets—cartons of 24
Daribiotic Soluble—powder in ¼ lb. jars

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Daribiotic Infusion—100-cc. multidose vials

Systemic infections:

Daribiotic Injectable—10-cc. vials

Important: Milk from treated animals should be discarded or used for purposes other than human consumption for at least 72 hours after the last treatment.

Write for prices, dosage information, and references.

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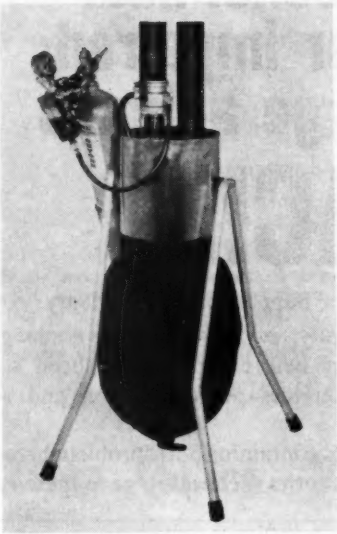

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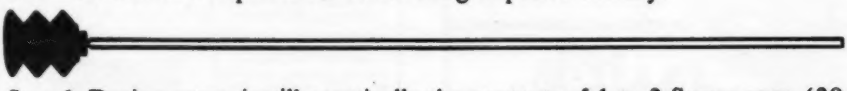

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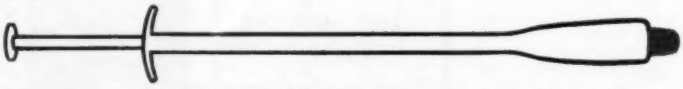

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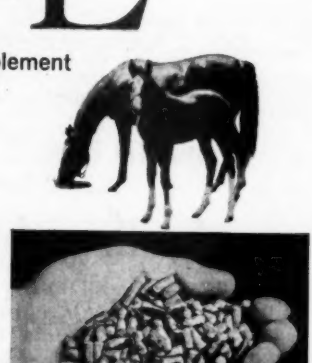

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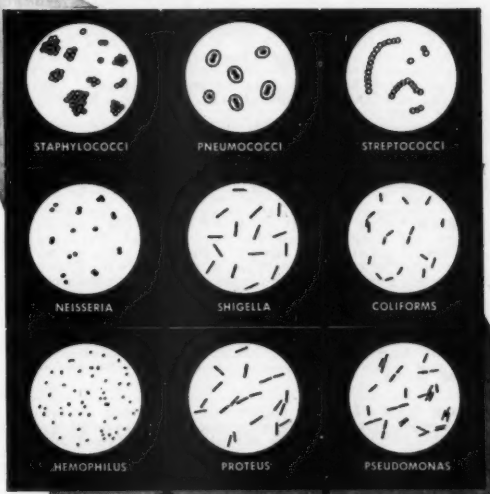

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Dec. **3-5. American Association of Equine Practitioners,** 8th annual meeting, Hotel Texas, Fort Worth, Texas. For further information, contact the Association, 531 Guaranty Bank Bldg., Denver 2, Colorado.

Dec. **4-5. Kentucky Veterinary Medical Association** meeting, Kentucky Hotel, Louisville, Ky. L. S. Shirrell, 545 E. Main St., Frankfort, secretary-treasurer.

Jan. **10-12. 54th Annual Conference for Veterinarians,** New York State Veterinary College, Cornell University, Ithaca, N.Y. George C. Poppensiek, dean.

Jan. **16-17. School of Veterinary Medicine of University of Pennsylvania,** 62nd annual conference of veterinarians. Robert Schwartzman, University of Pennsylvania, Philadelphia 4, chairman.

Jan. **17-19. 39th Annual Postgraduate Conference for Veterinarians,** College of Veterinary Medicine, Michigan State University, East Lansing, Mich. W. W. Armistead, Dean.

Jan. **21-23. Oklahoma Veterinary Medical Association,** annual meeting, Mayo Hotel, Tulsa. W. D. Speer, 538 S. Madison, Tulsa, secretary.

Jan. **22-24. Minnesota Veterinary Medical Association,** annual meeting, Hotel St. Paul, St. Paul, Minn. B. S. Pomeroy, 1443 Raymond Ave., St. Paul, secretary-treasurer.

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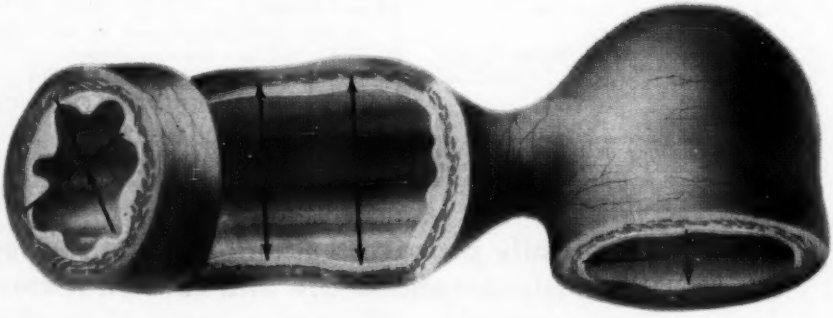

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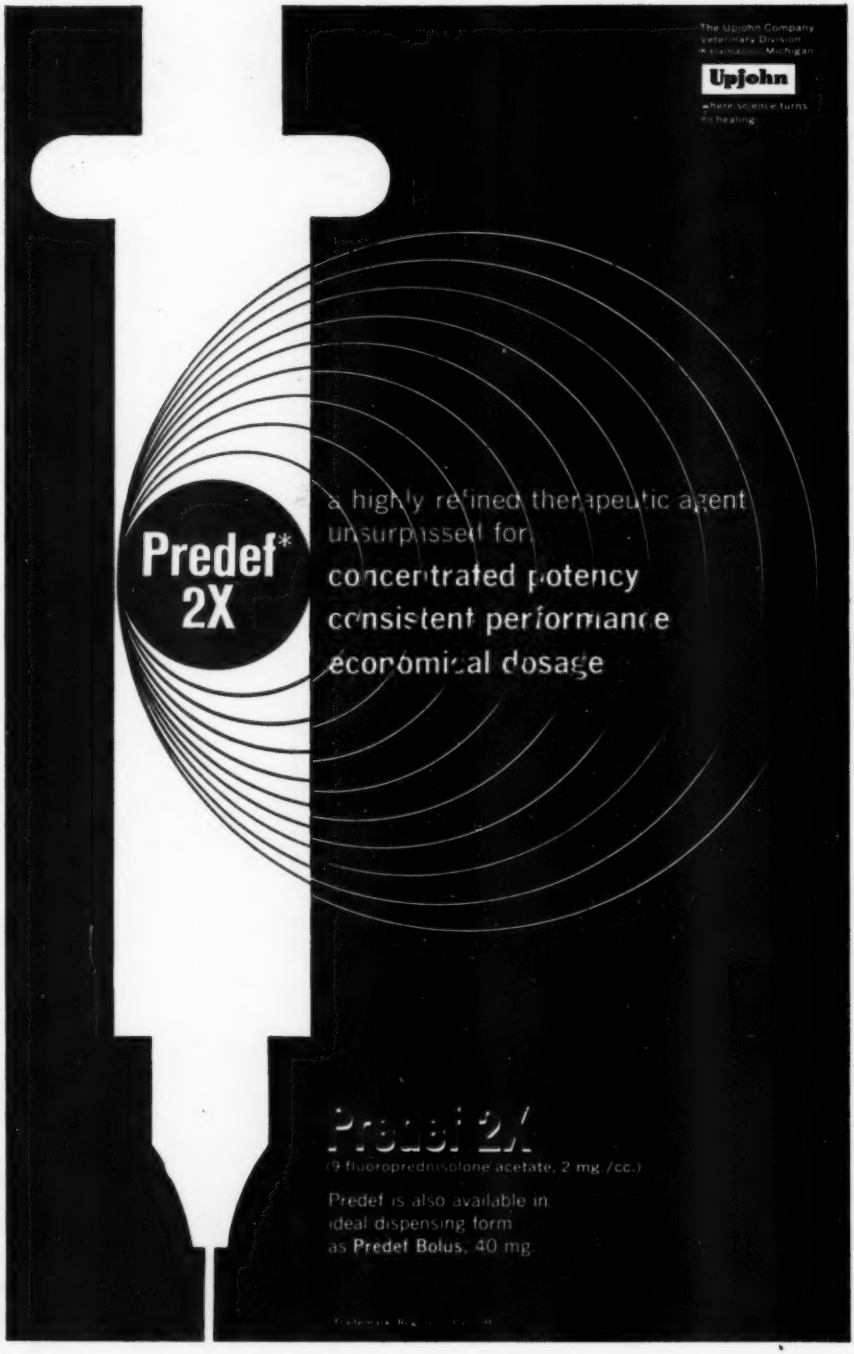
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